20190" 0h2580C7

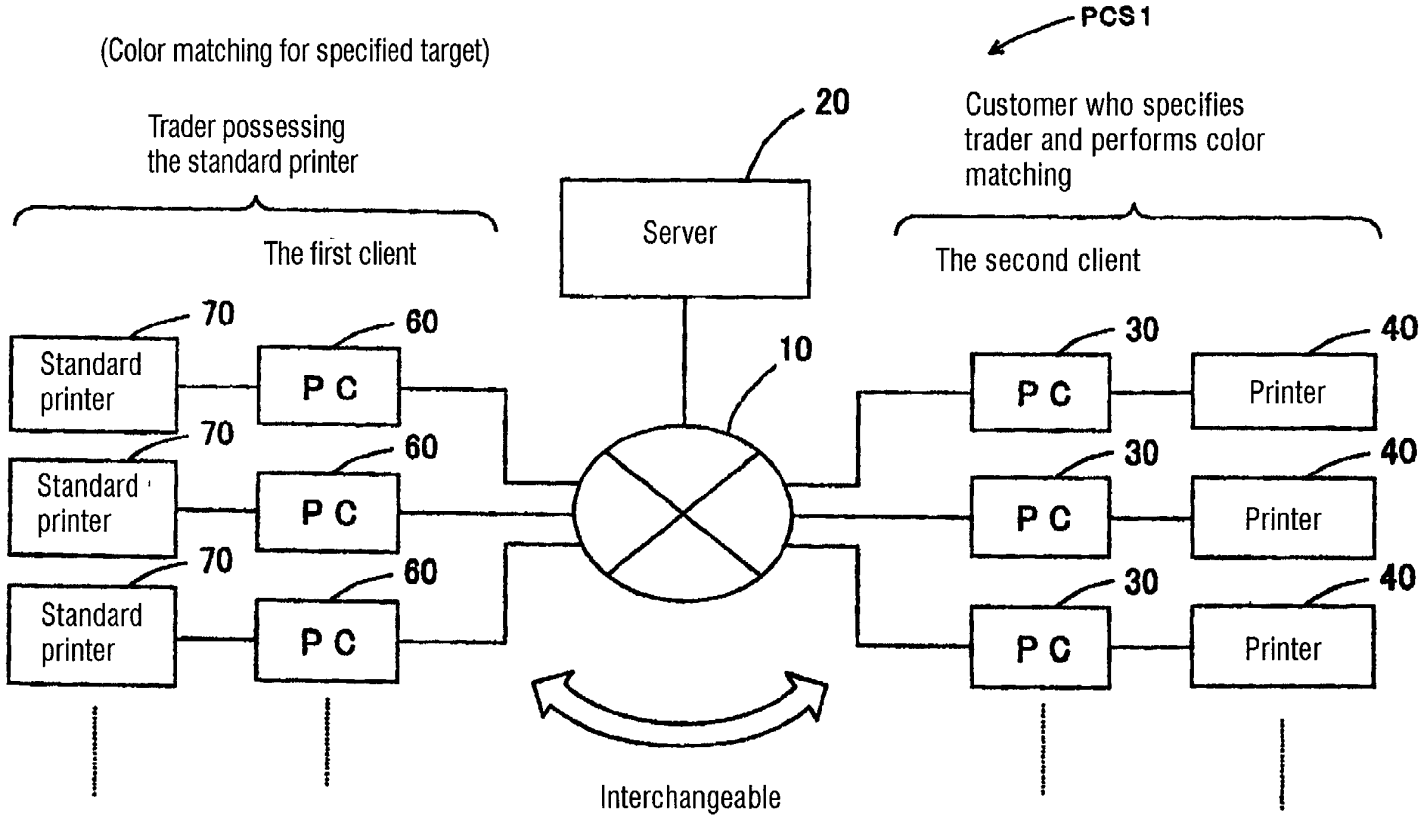

FIG. 1

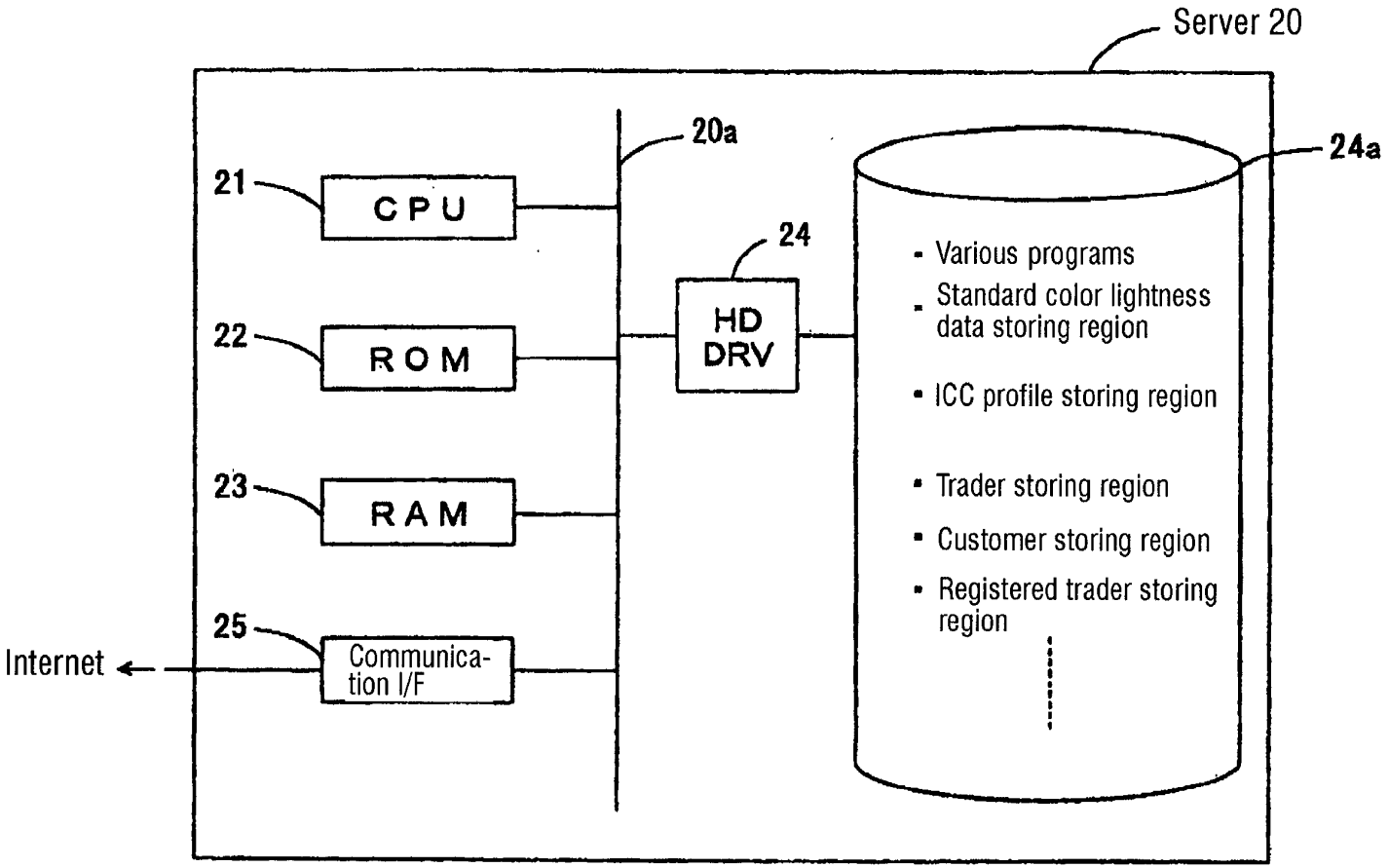
Server 20
20a
21
CPU
22
ROM
23
RAM
25
Communica-
tion I/F
Internet
24
HD
DRV
24a
- Various programs
- Standard color lightness data storing region
- ICC profile storing region
- Trader storing region
- Customer storing region
- Registered trader storing region

FIG.2

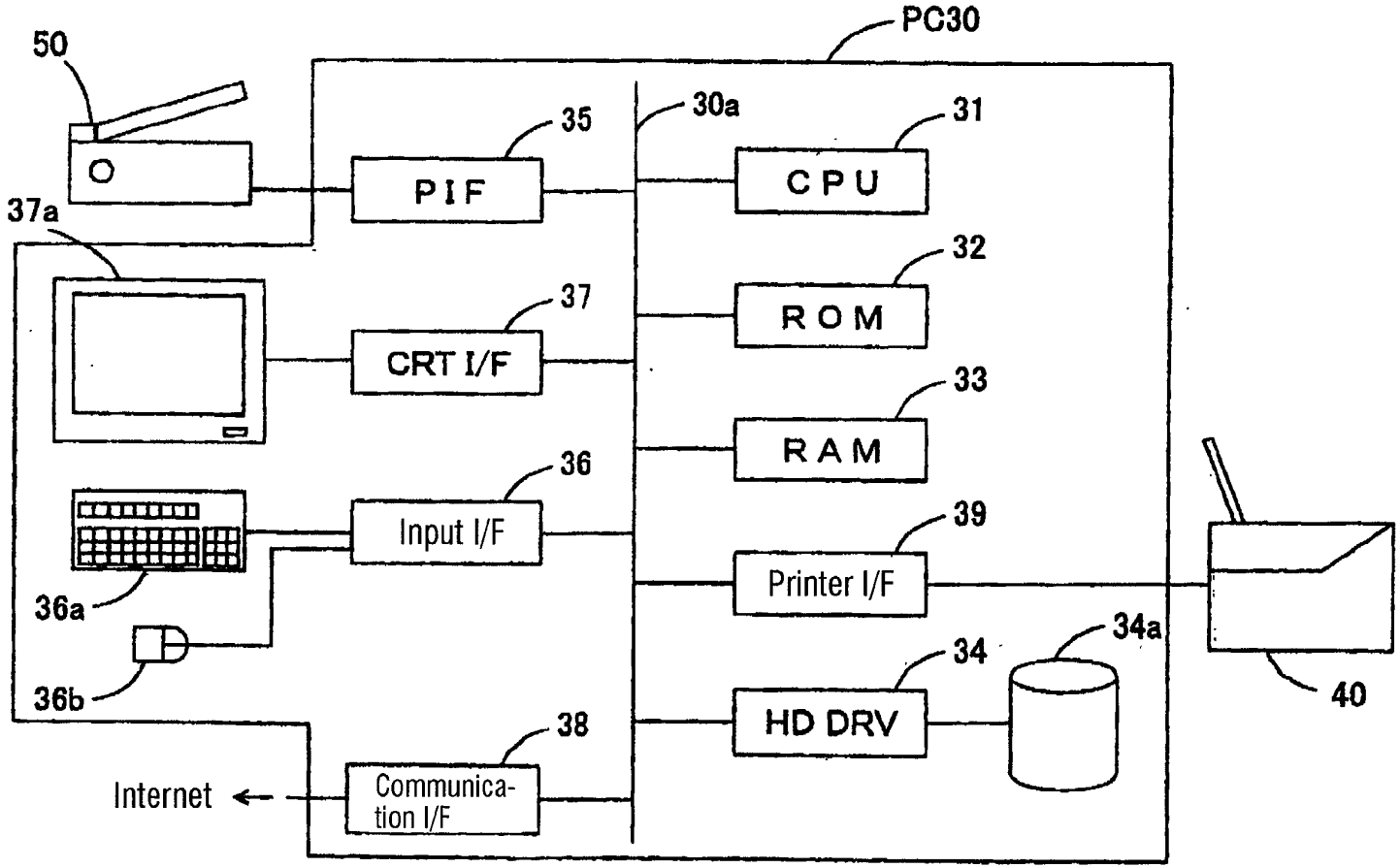
PC30
50
35
30a
31
PIF
CPU
37a
32
37
ROM
CRT I/F
33
RAM
36
Input I/F
39
Printer I/F
36a
34a
34
36b
HD DRV
40
38
Internet
Communica-
tion I/F

FIG.3

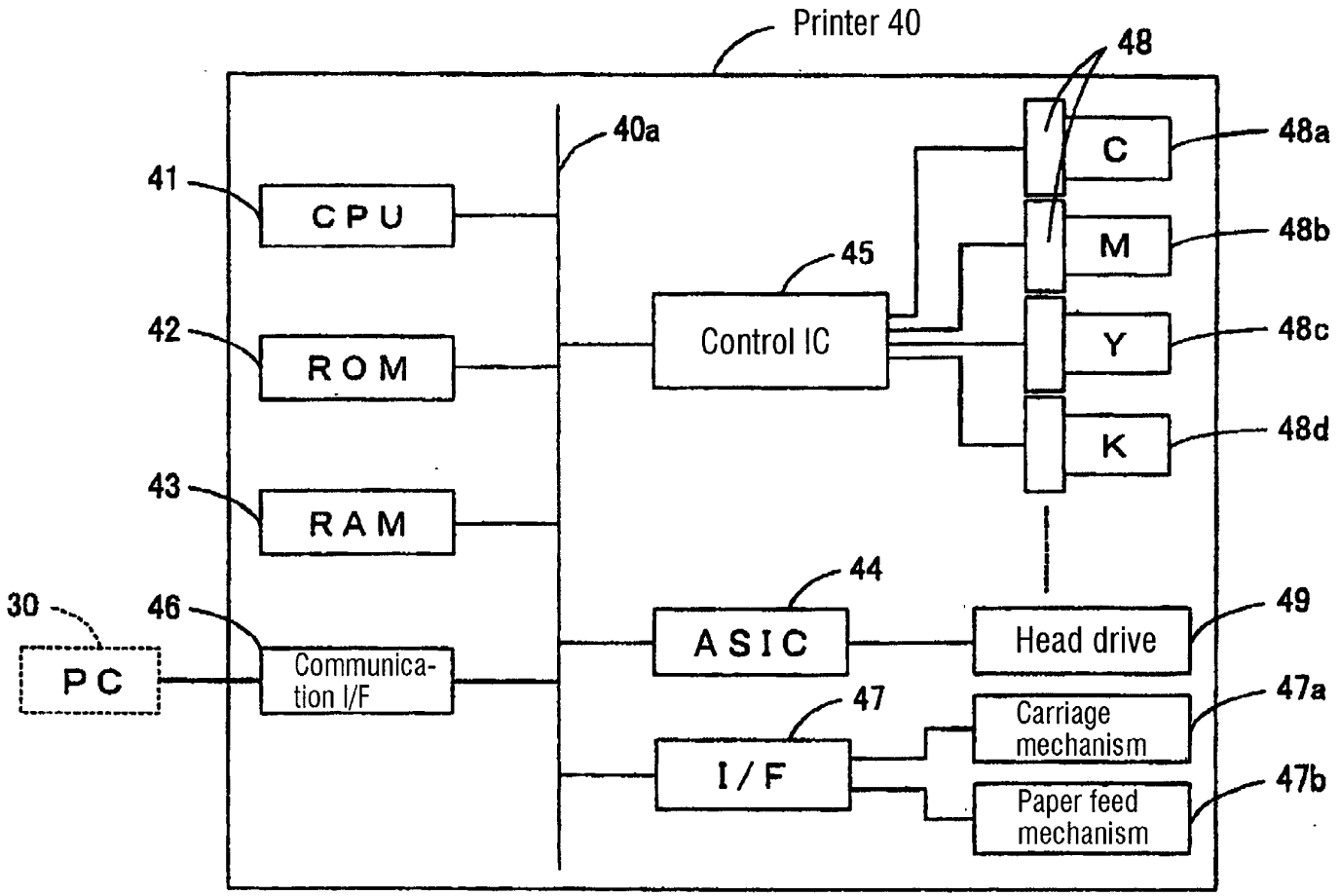
Printer 40
48
40a
41
CPU
42
ROM
43
RAM
30
46
PC
Communica-
tion I/F
45
Control IC
44
ASIC
47
I/F
C
M
Y
K
48a
48b
48c
48d
Head drive
49
Carriage
mechanism
47a
Paper feed
mechanism
47b

FIG.4

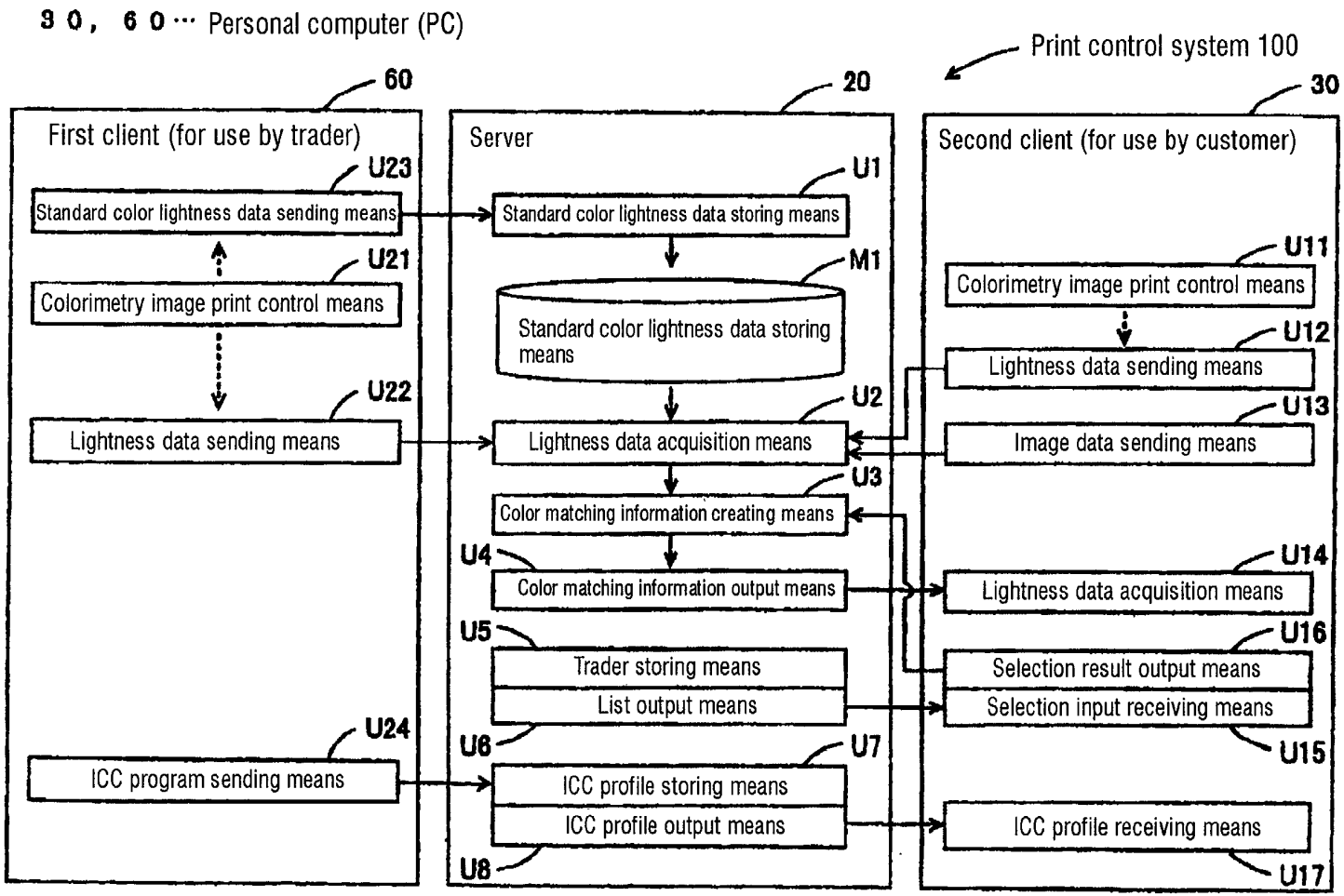
30, 60 ··· Personal computer (PC)
Print control system 100
60
First client (for use by trader)
U23
Standard color lightness data sending means
U21
Colorimetry image print control means
U22
Lightness data sending means
U24
ICC program sending means
20
Server
U1
Standard color lightness data storing means
M1
Standard color lightness data storing means
U2
Lightness data acquisition means
U3
Color matching information creating means
U4
Color matching information output means
U5
Trader storing means
List output means
U6
U7
ICC profile storing means
ICC profile output means
U8
30
Second client (for use by customer)
U11
Colorimetry image print control means
U12
Lightness data sending means
U13
Image data sending means
U14
Lightness data acquisition means
U16
Selection result output means
Selection input receiving means
U15
ICC profile receiving means
U17

FIG.5

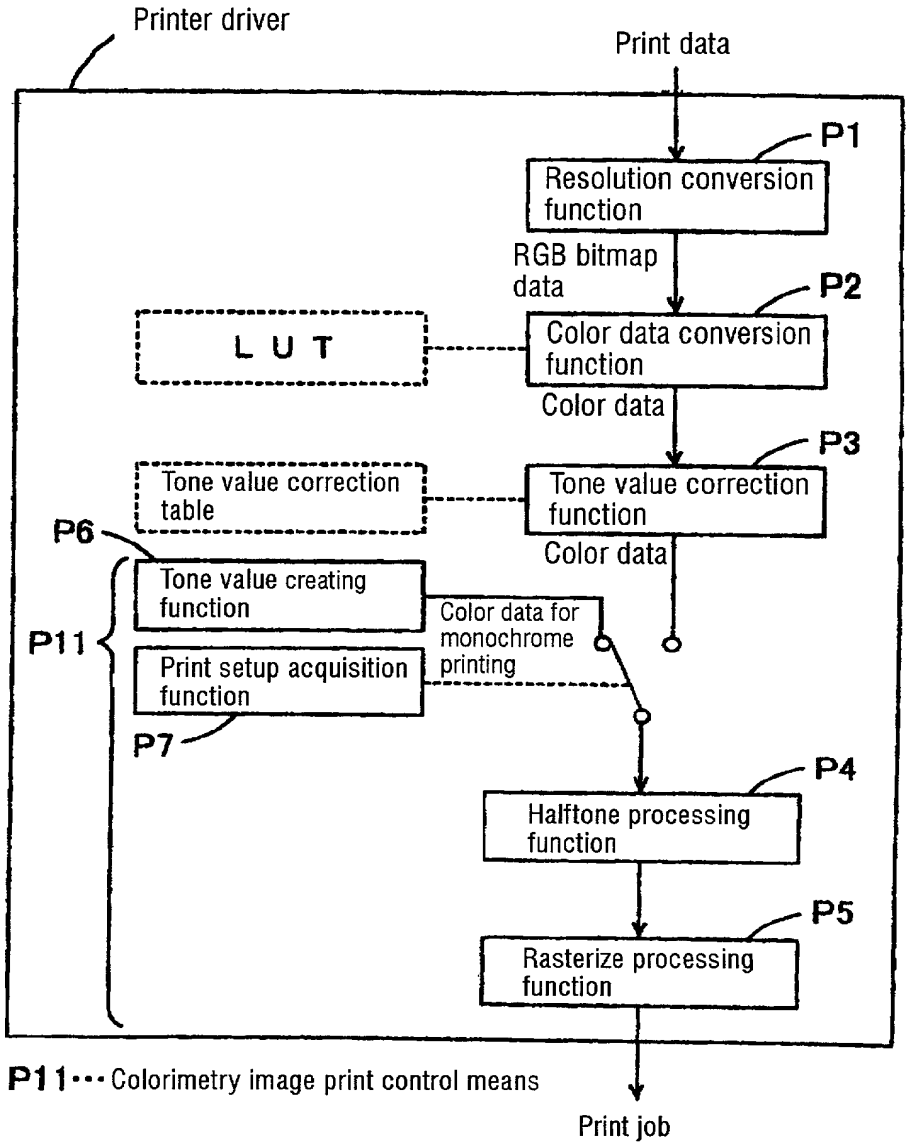
Printer driver
Print data
P1
Resolution conversion function
RGB bitmap data
P2
L U T
Color data conversion function
Color data
P3
Tone value correction table
Tone value correction function
Color data
P6
Tone value creating function
P11
Color data for monochrome printing
Print setup acquisition function
P7
P4
Halftone processing function
P5
Rasterize processing function
P11··· Colorimetry image print control means
Print job

FIG.6

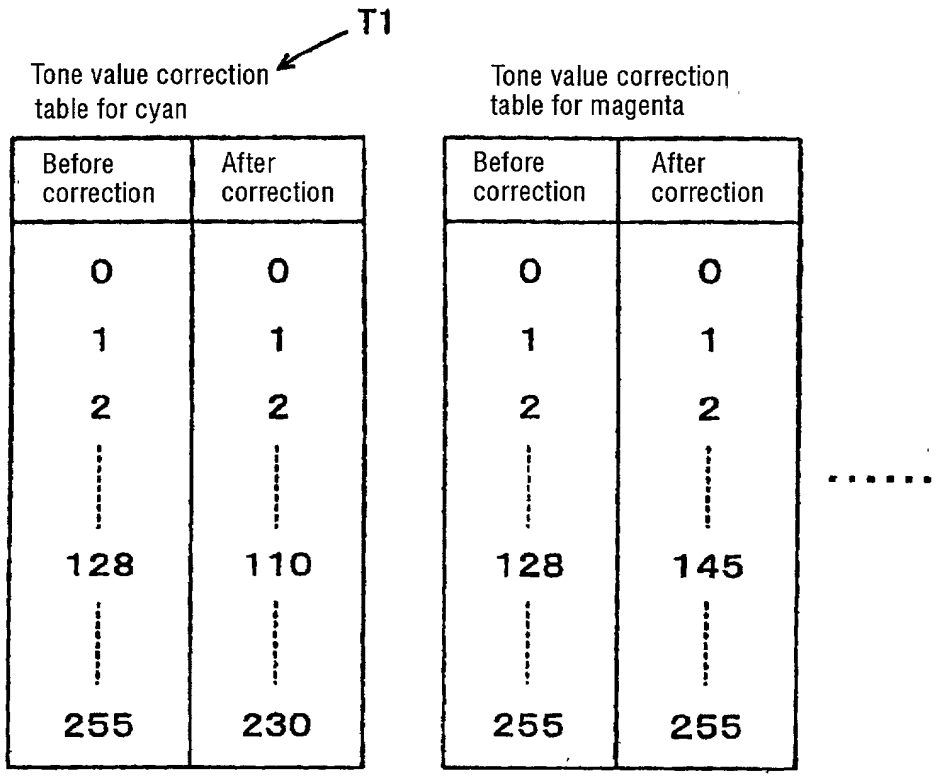
T1
Tone value correction table for cyan
Before correction
After correction
0
1
2
128
255
230
110
Tone value correction table for magenta
Before correction
After correction
0
1
2
128
255
145
255

FIG.7

US 6,256,050 B1

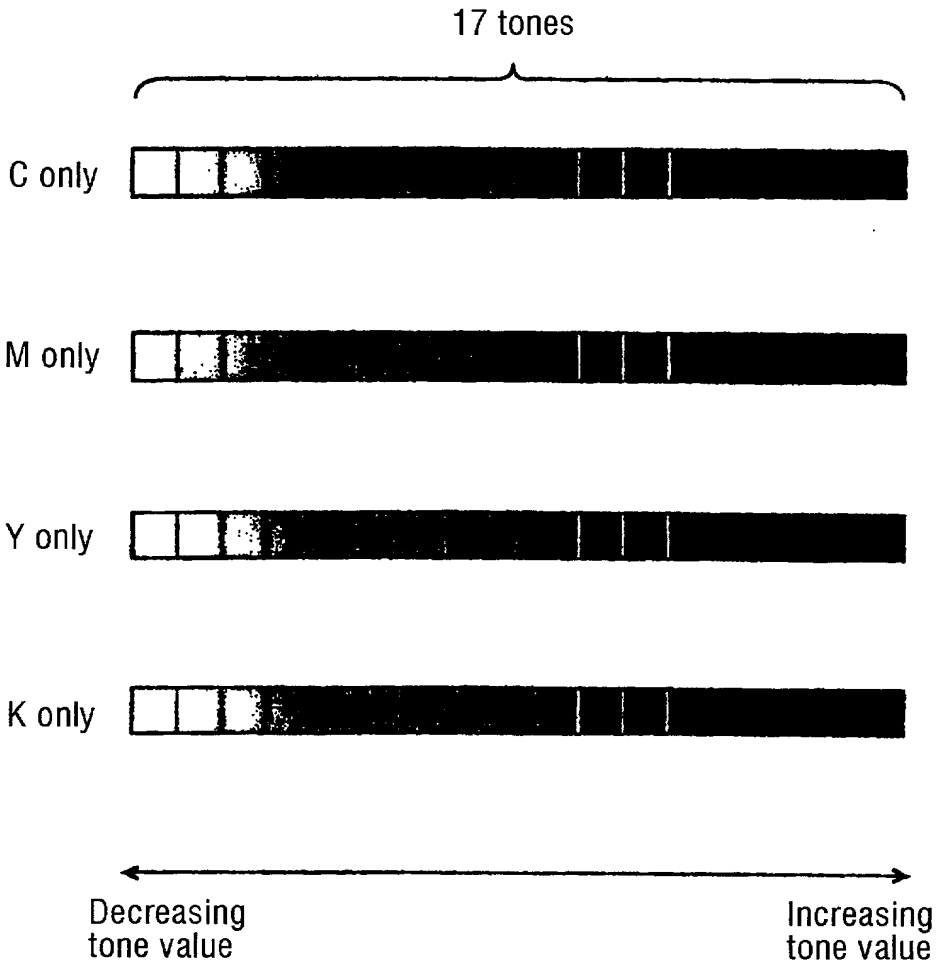

FIG.8

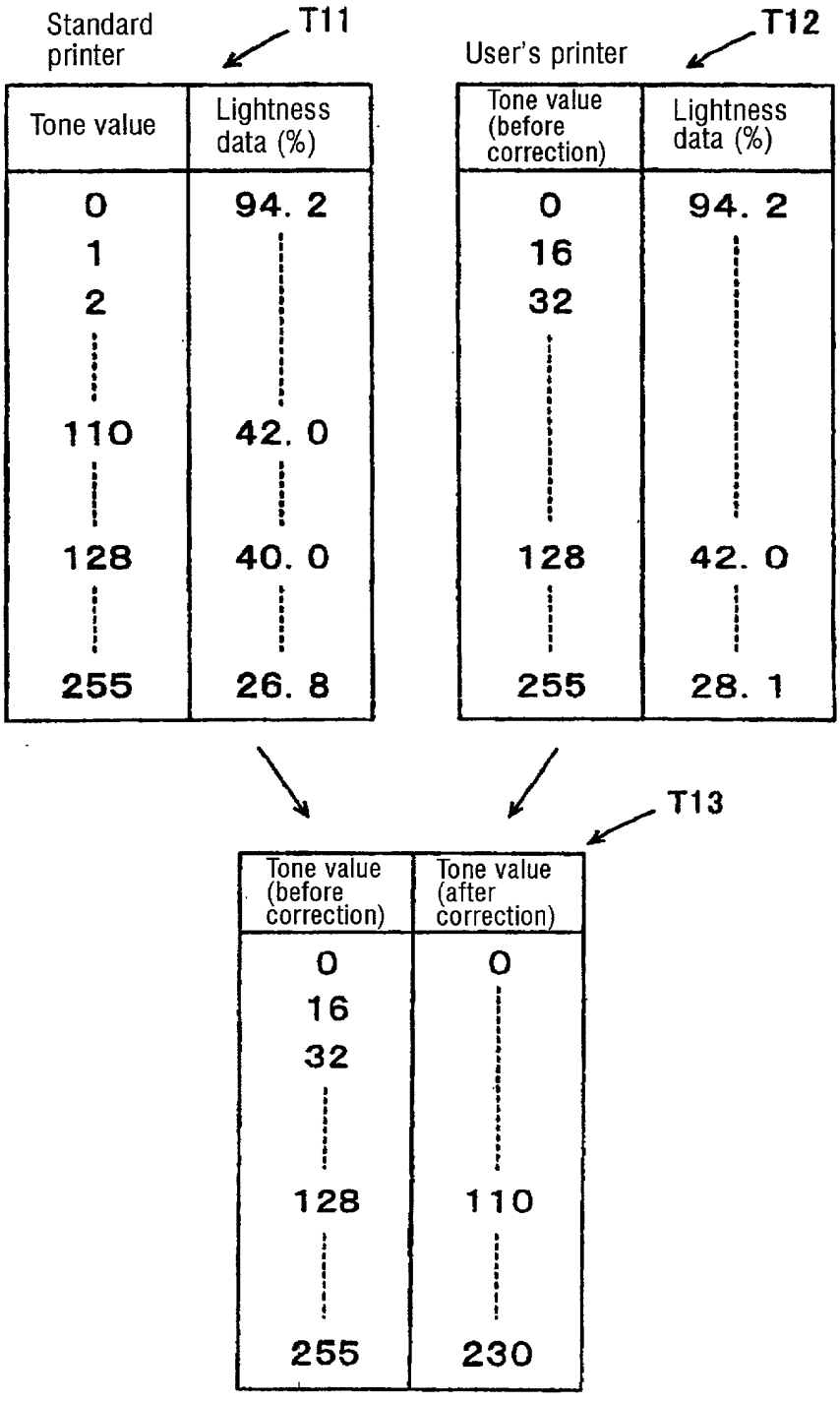
Standard printer
T11
Tone value
Lightness data (%)
0
1
2
110
128
255
94. 2
42. 0
40. 0
26. 8
User's printer
T12
Tone value (before correction)
Lightness data (%)
0
16
32
128
255
94. 2
42. 0
28. 1
T13
Tone value (before correction)
Tone value (after correction)
0
16
32
128
255
0
110
230

FIG.9

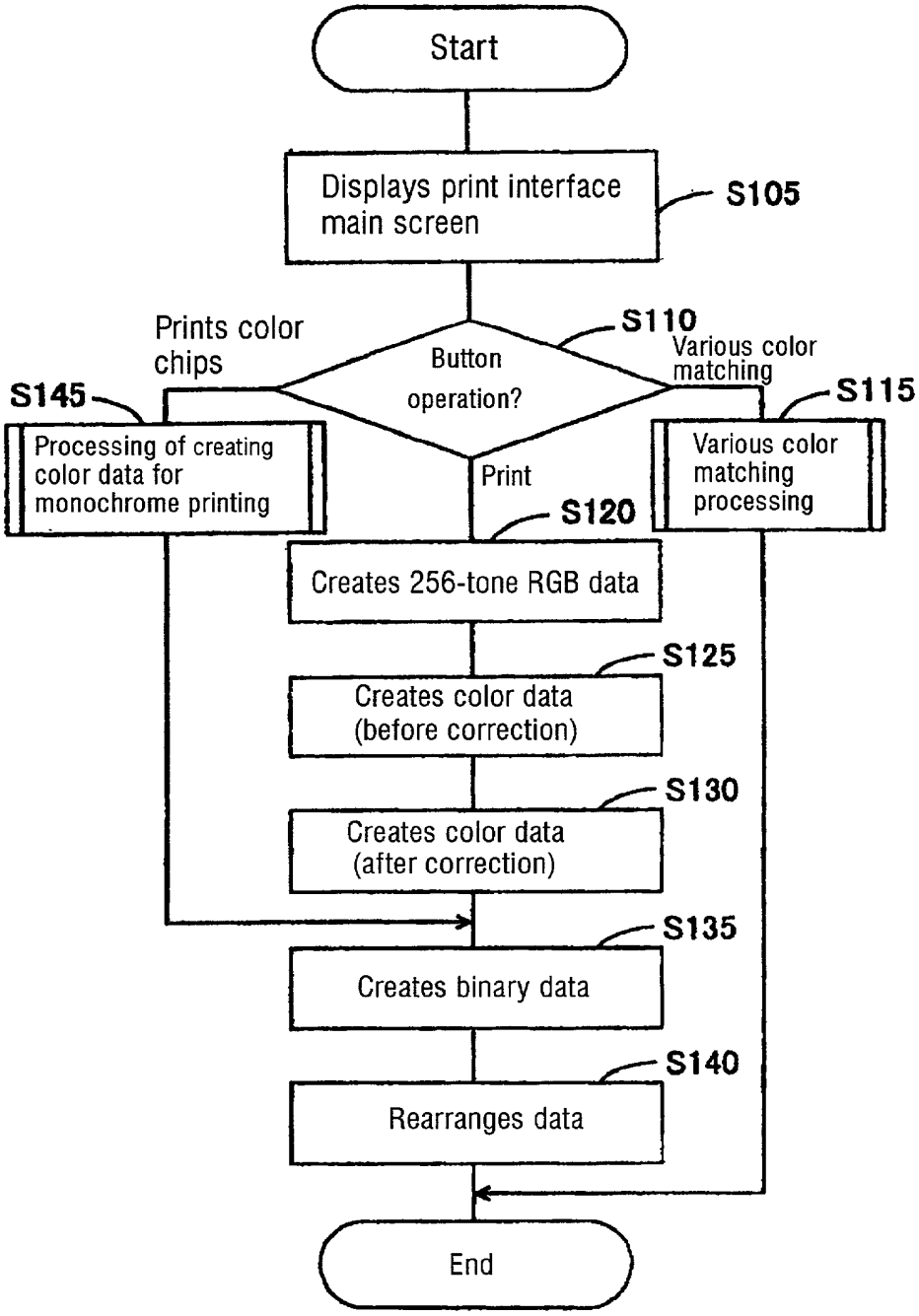
Start
Displays print interface main screen
S105
S110
Button operation?
Prints color chips
Various color matching
Print
S145
Processing of creating color data for monochrome printing
S115
Various color matching processing
S120
Creates 256-tone RGB data
S125
Creates color data (before correction)
S130
Creates color data (after correction)
S135
Creates binary data
S140
Rearranges data
End

FIG. 10

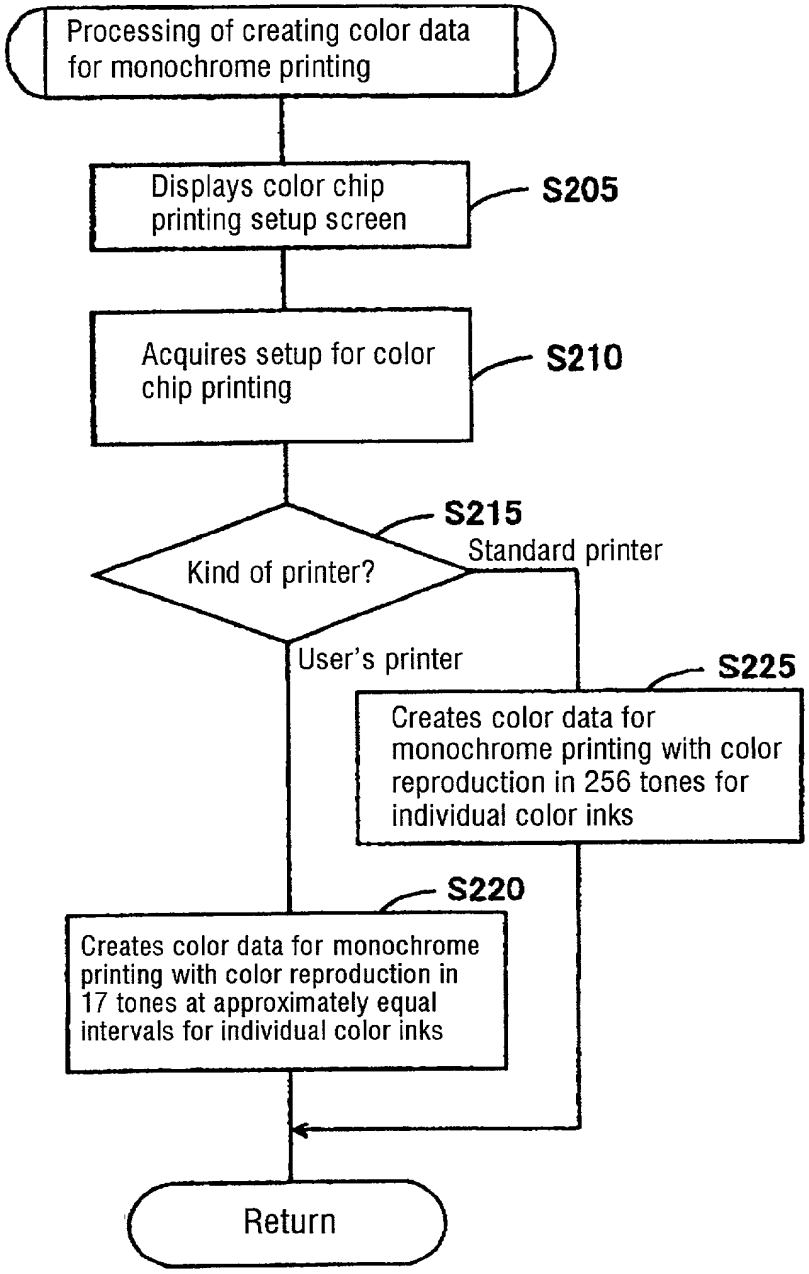
Processing of creating color data for monochrome printing
Displays color chip printing setup screen
S205
Acquires setup for color chip printing
S210
S215
Kind of printer?
Standard printer
User's printer
S225
Creates color data for monochrome printing with color reproduction in 256 tones for individual color inks
S220
Creates color data for monochrome printing with color reproduction in 17 tones at approximately equal intervals for individual color inks
Return

FIG.11

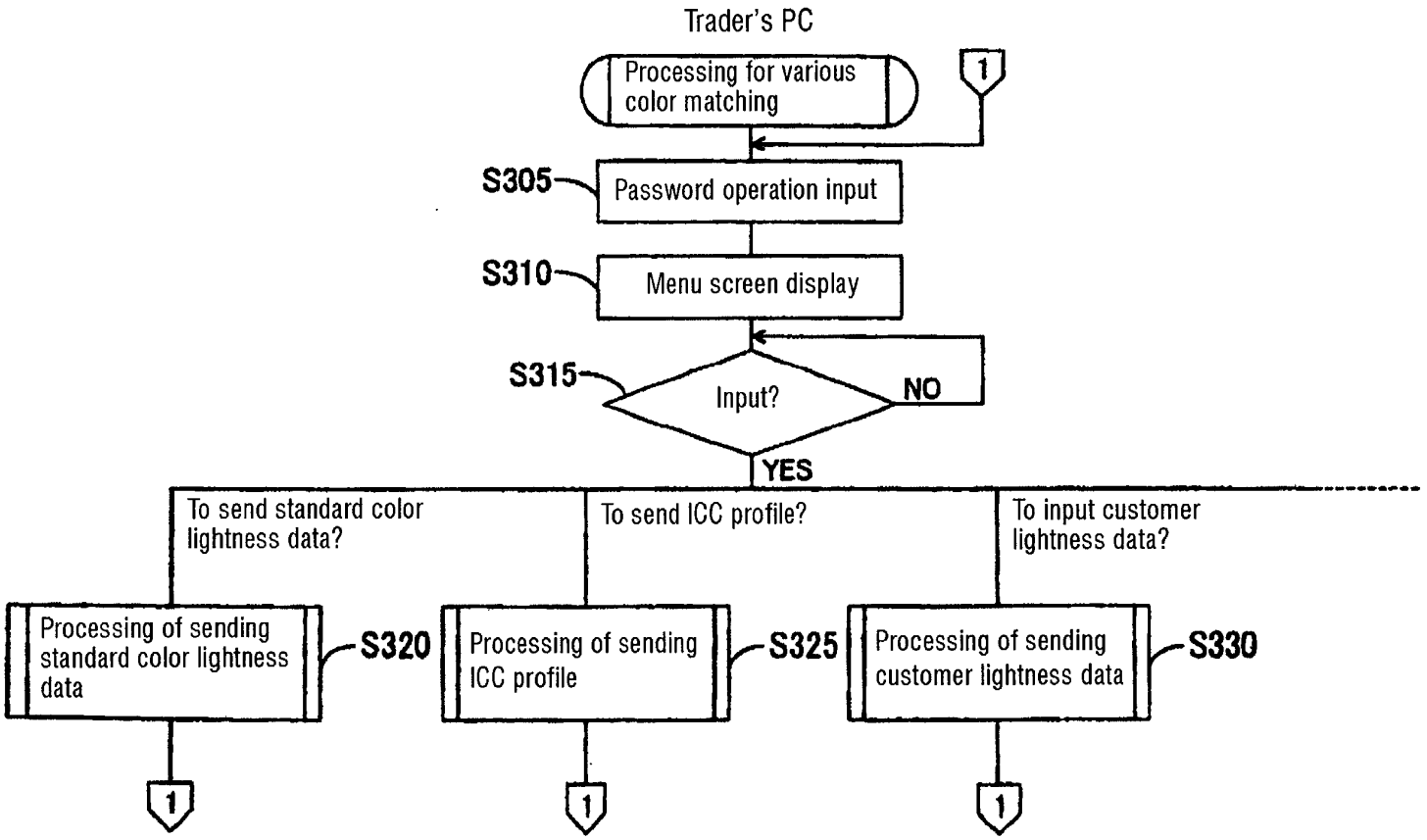
Trader's PC
Processing for various color matching
1
S305
Password operation input
S310
Menu screen display
S315
Input?
NO
YES
To send standard color lightness data?
To send ICC profile?
To input customer lightness data?
Processing of sending standard color lightness data
S320
Processing of sending ICC profile
S325
Processing of sending customer lightness data
S330
1
1
1

FIG.12

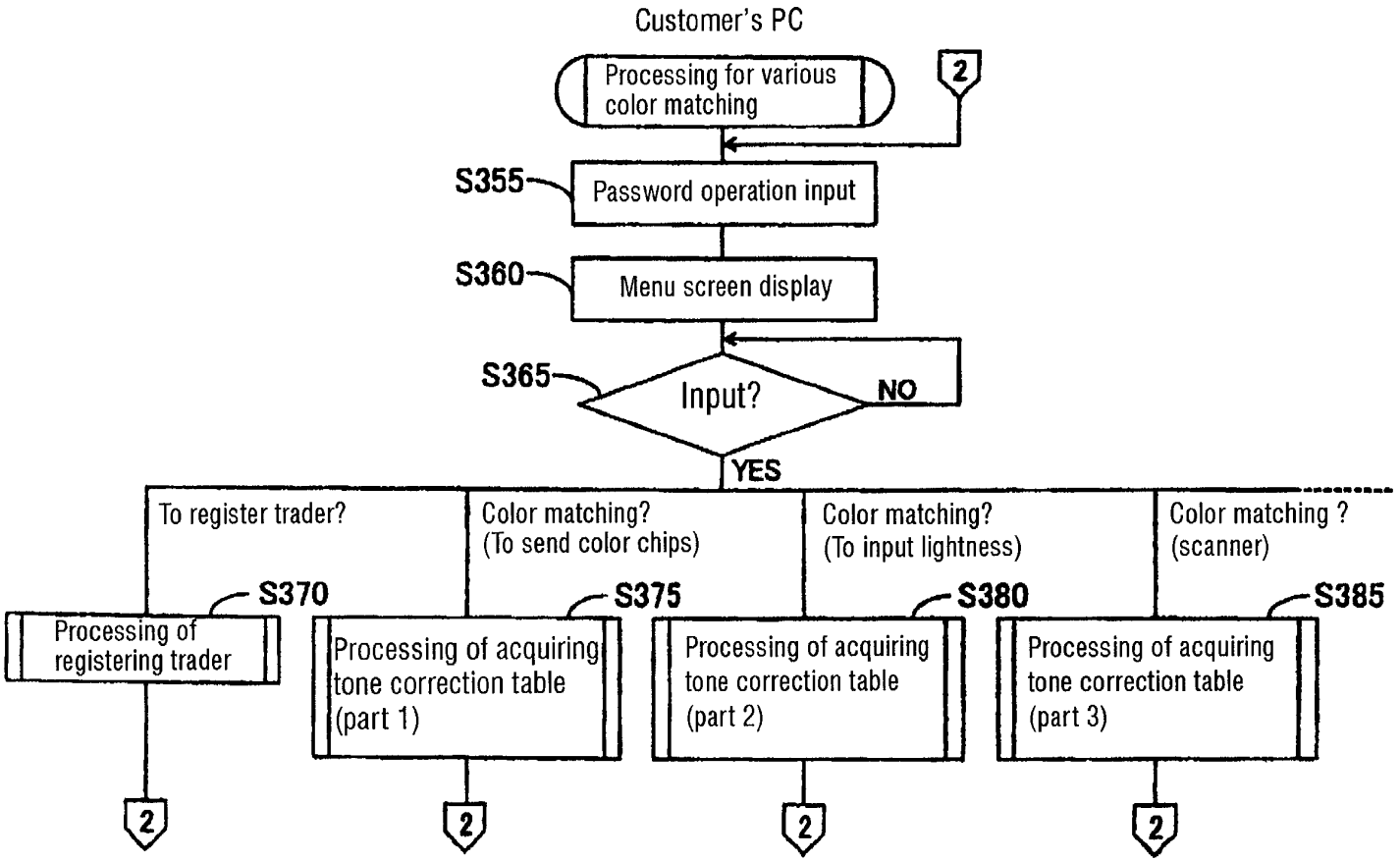
Customer's PC
Processing for various color matching
2
S355
Password operation input
S360
Menu screen display
S365
Input?
NO
YES
To register trader?
Color matching? (To send color chips)
Color matching? (To input lightness)
Color matching ? (scanner)
S370
S375
S380
S385
Processing of registering trader
Processing of acquiring tone correction table (part 1)
Processing of acquiring tone correction table (part 2)
Processing of acquiring tone correction table (part 3)
2
2
2
2

FIG.13

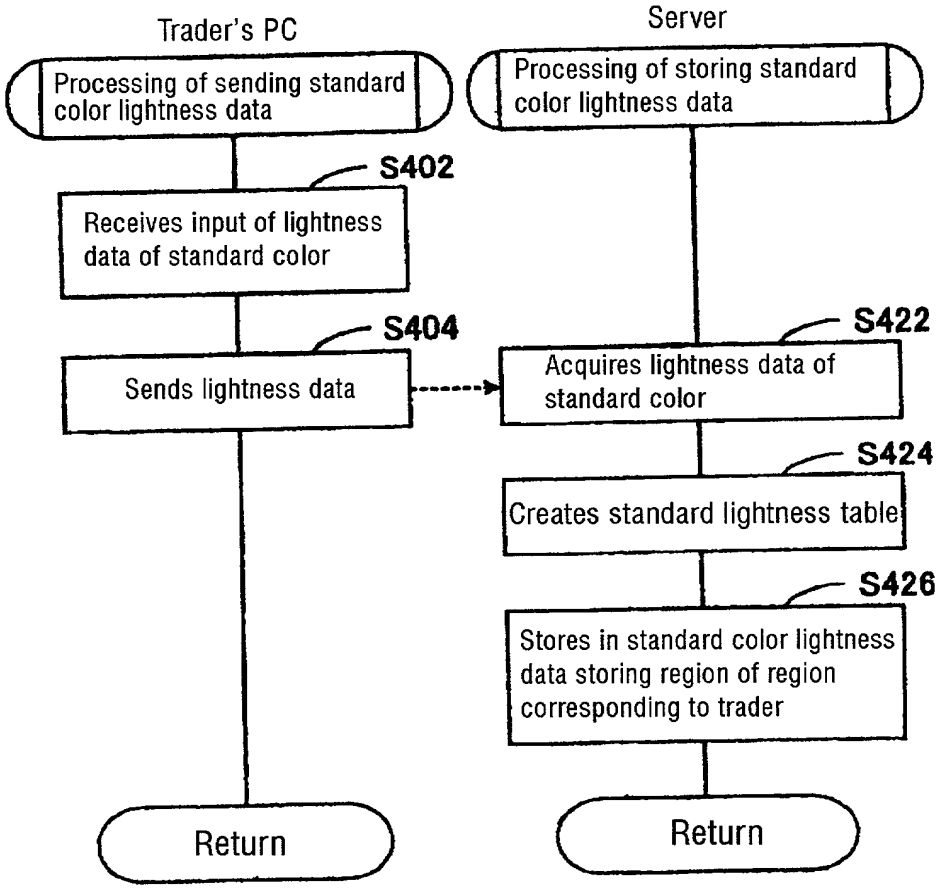
Trader's PC
Server
Processing of sending standard color lightness data
Processing of storing standard color lightness data
S402
Receives input of lightness data of standard color
S404
Sends lightness data
S422
Acquires lightness data of standard color
S424
Creates standard lightness table
S426
Stores in standard color lightness data storing region of region corresponding to trader
Return
Return

FIG.14

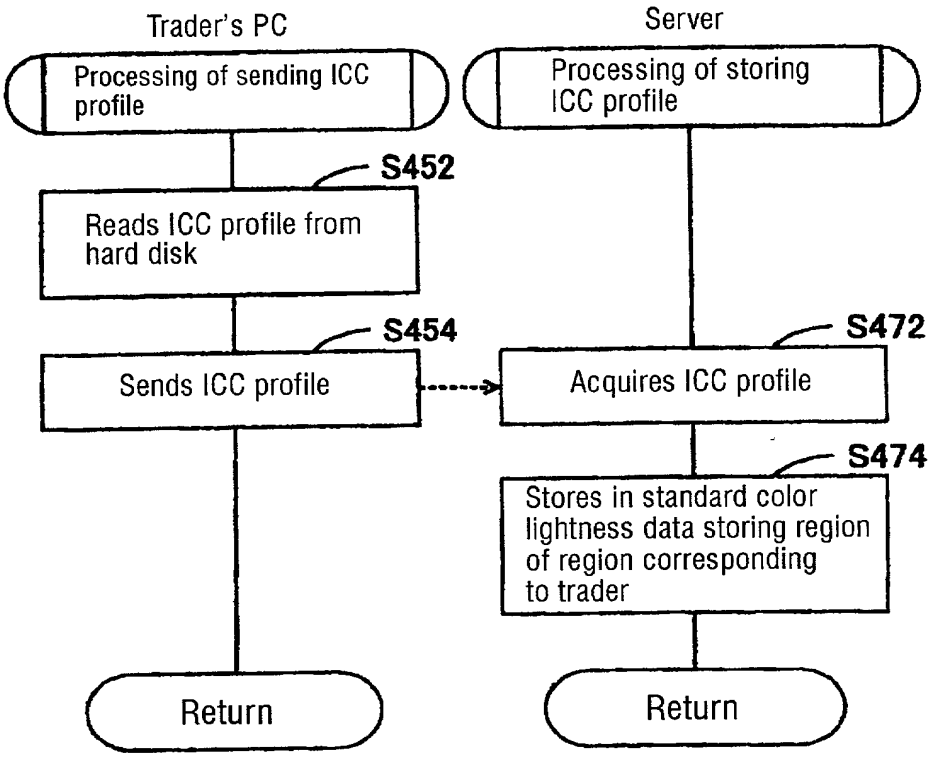
Trader's PC
Server
Processing of sending ICC profile
Processing of storing ICC profile
S452
Reads ICC profile from hard disk
S454
Sends ICC profile
S472
Acquires ICC profile
S474
Stores in standard color lightness data storing region of region corresponding to trader
Return
Return

FIG.15

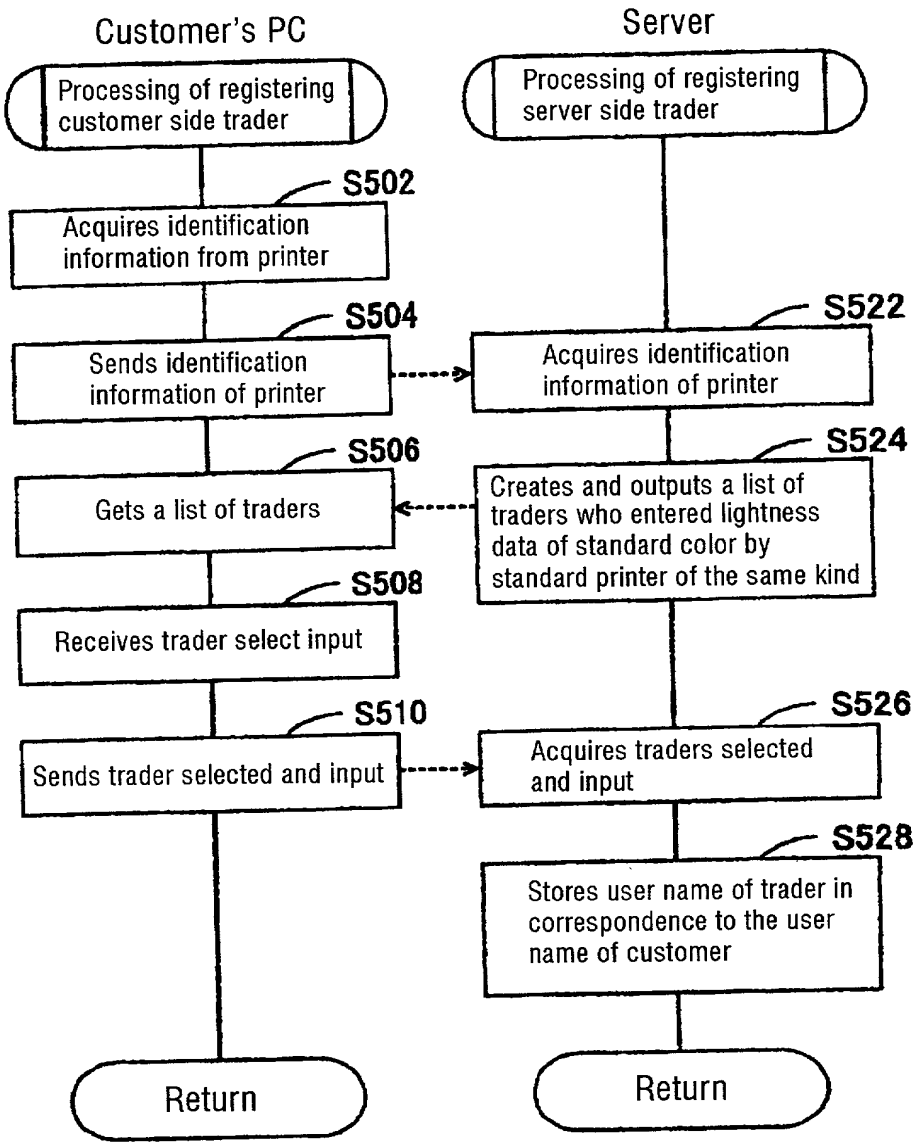
Customer's PC
Server
Processing of registering customer side trader
Processing of registering server side trader
S502
Acquires identification information from printer
S504
Sends identification information of printer
S522
Acquires identification information of printer
S506
Gets a list of traders
S524
Creates and outputs a list of traders who entered lightness data of standard color by standard printer of the same kind
S508
Receives trader select input
S510
Sends trader selected and input
S526
Acquires traders selected and input
S528
Stores user name of trader in correspondence to the user name of customer
Return
Return

FIG. 16

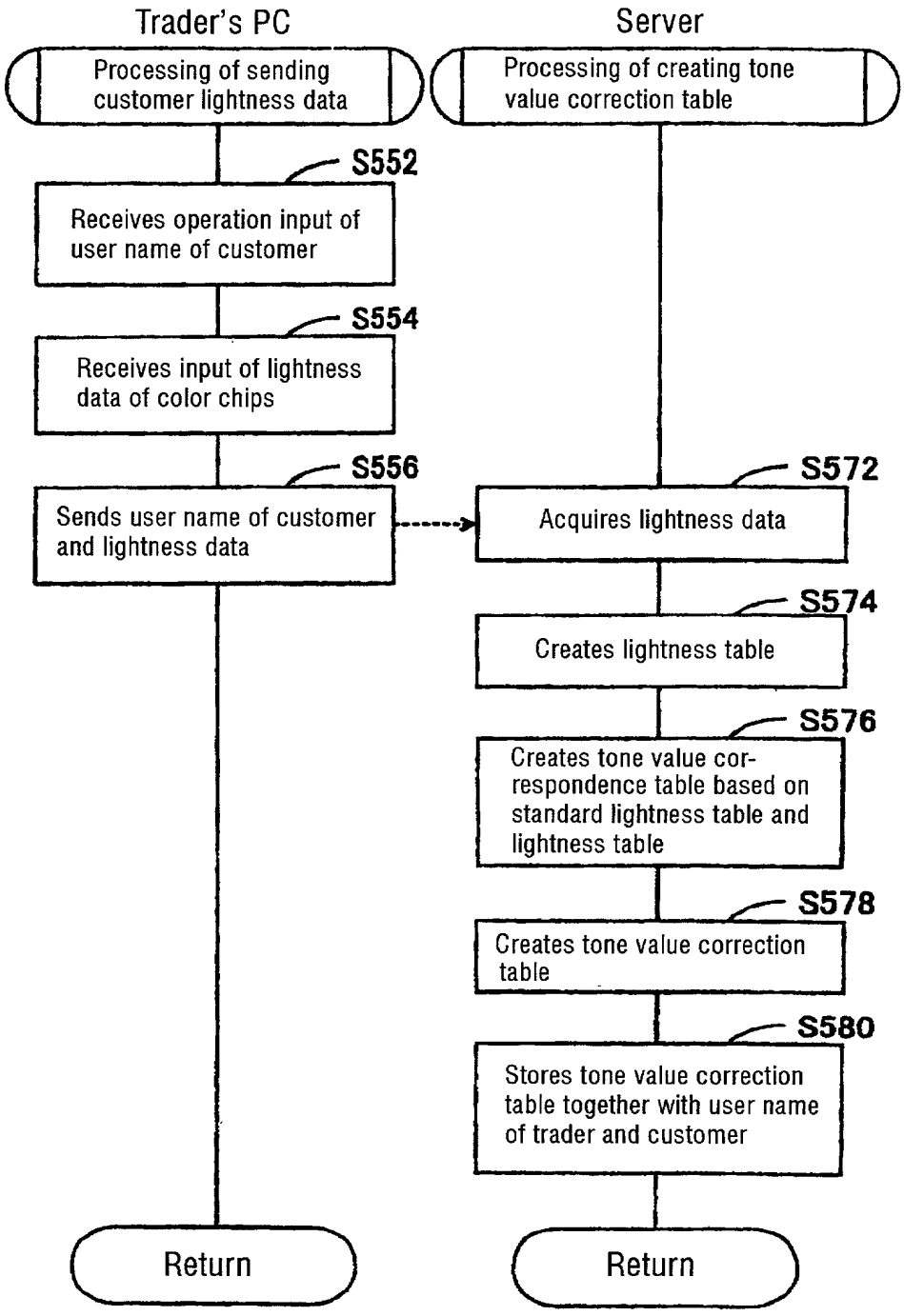
Trader's PC
Server
Processing of sending customer lightness data
Processing of creating tone value correction table
S552
Receives operation input of user name of customer
S554
Receives input of lightness data of color chips
S556
Sends user name of customer and lightness data
S572
Acquires lightness data
S574
Creates lightness table
S576
Creates tone value correspondence table based on standard lightness table and lightness table
S578
Creates tone value correction table
S580
Stores tone value correction table together with user name of trader and customer
Return
Return

FIG. 17

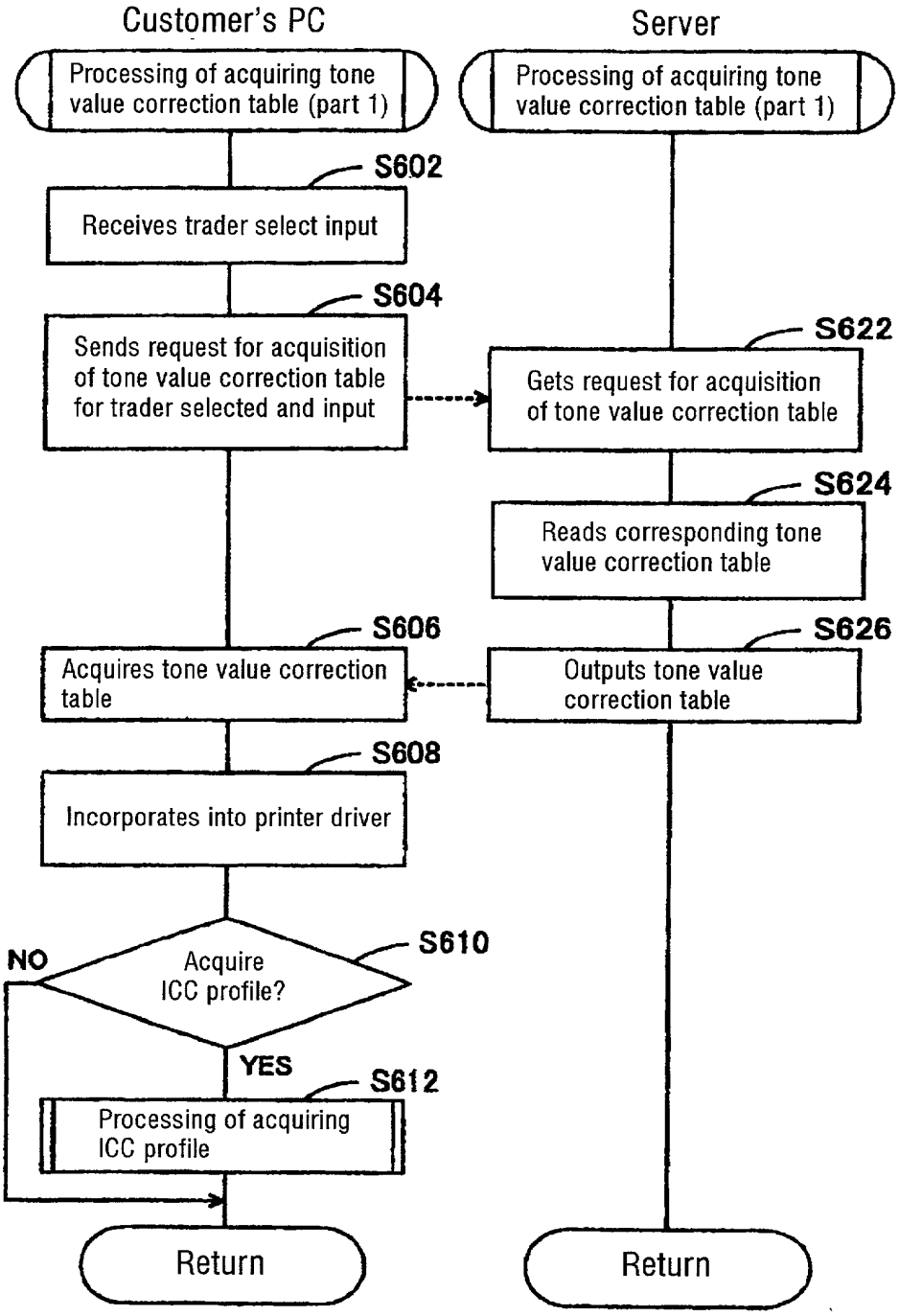
Customer's PC
Server
Processing of acquiring tone value correction table (part 1)
Processing of acquiring tone value correction table (part 1)
S602
Receives trader select input
S604
Sends request for acquisition of tone value correction table for trader selected and input
S622
Gets request for acquisition of tone value correction table
S624
Reads corresponding tone value correction table
S606
Acquires tone value correction table
S626
Outputs tone value correction table
S608
Incorporates into printer driver
NO
Acquire ICC profile?
S610
YES
S612
Processing of acquiring ICC profile
Return
Return

FIG.18

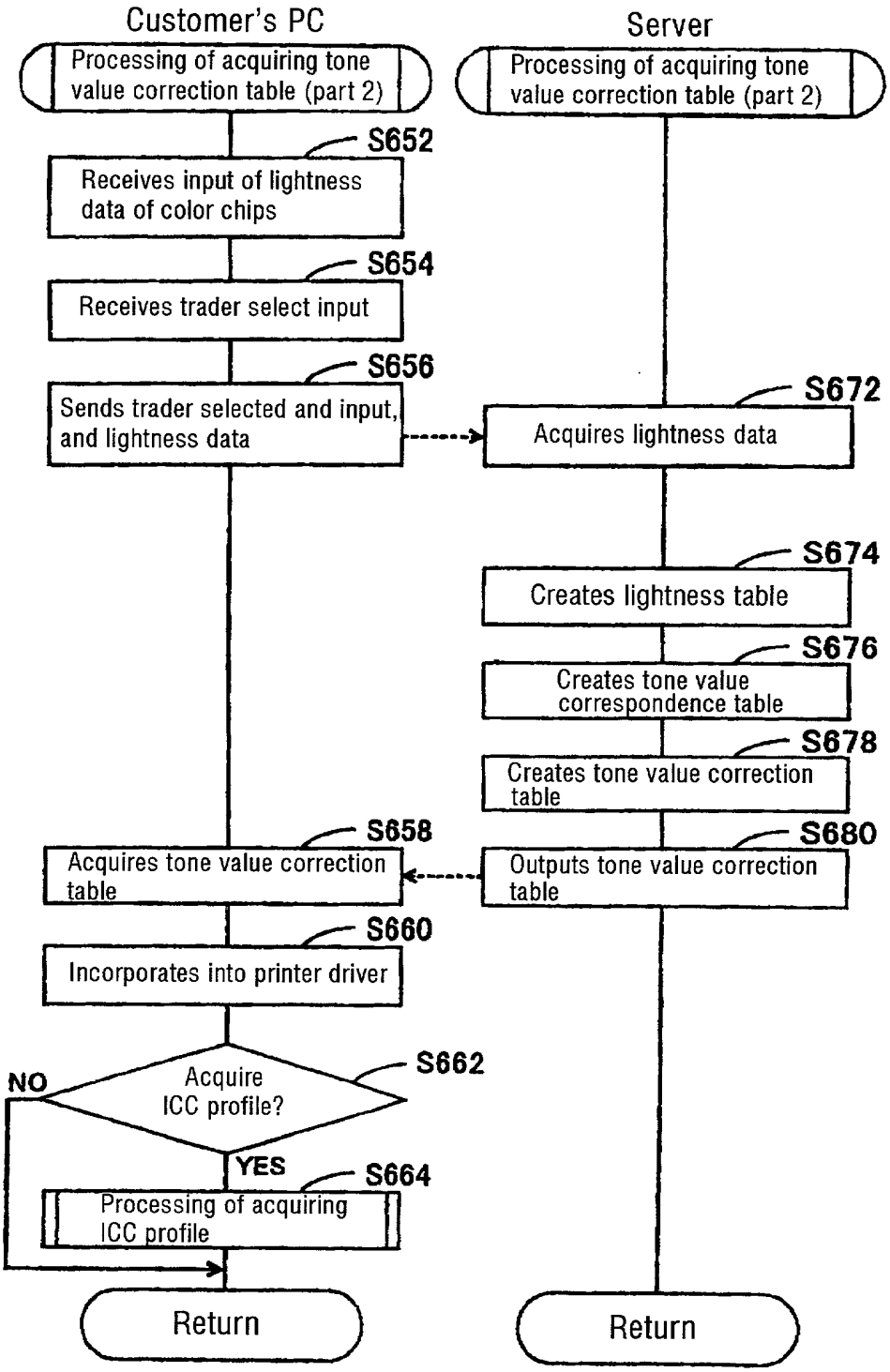
Customer's PC
Server
Processing of acquiring tone value correction table (part 2)
Processing of acquiring tone value correction table (part 2)
S652
Receives input of lightness data of color chips
S654
Receives trader select input
S656
Sends trader selected and input, and lightness data
S672
Acquires lightness data
S674
Creates lightness table
S676
Creates tone value correspondence table
S678
Creates tone value correction table
S680
Outputs tone value correction table
S658
Acquires tone value correction table
S660
Incorporates into printer driver
S662
Acquire ICC profile?
NO
YES
S664
Processing of acquiring ICC profile
Return
Return

FIG. 19

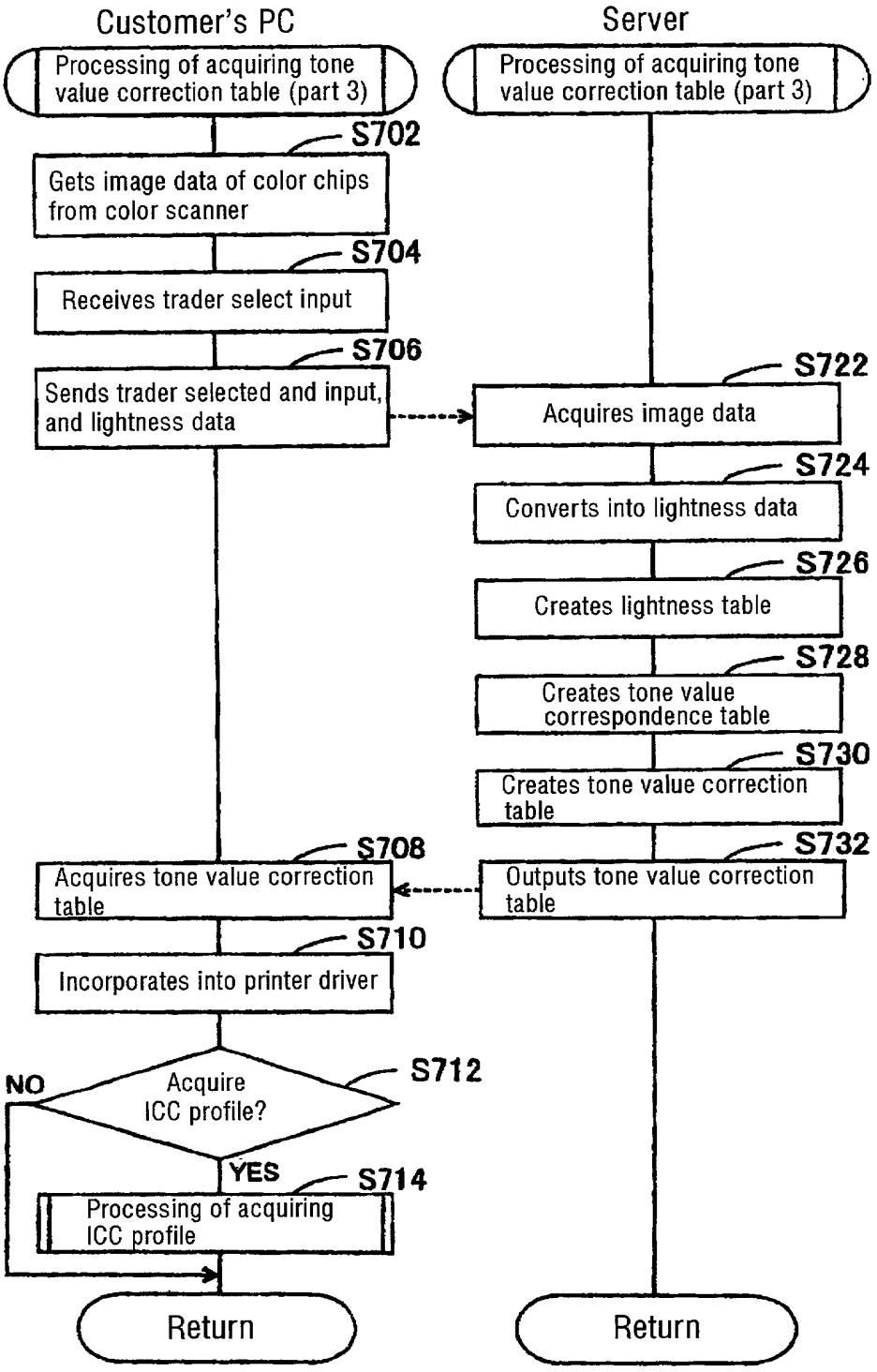
Customer's PC
Server
Processing of acquiring tone value correction table (part 3)
Processing of acquiring tone value correction table (part 3)
S702
Gets image data of color chips from color scanner
S704
Receives trader select input
S706
Sends trader selected and input, and lightness data
S722
Acquires image data
S724
Converts into lightness data
S726
Creates lightness table
S728
Creates tone value correspondence table
S730
Creates tone value correction table
S732
Outputs tone value correction table
S708
Acquires tone value correction table
S710
Incorporates into printer driver
S712
Acquire ICC profile?
NO
YES
S714
Processing of acquiring ICC profile
Return
Return

FIG.20

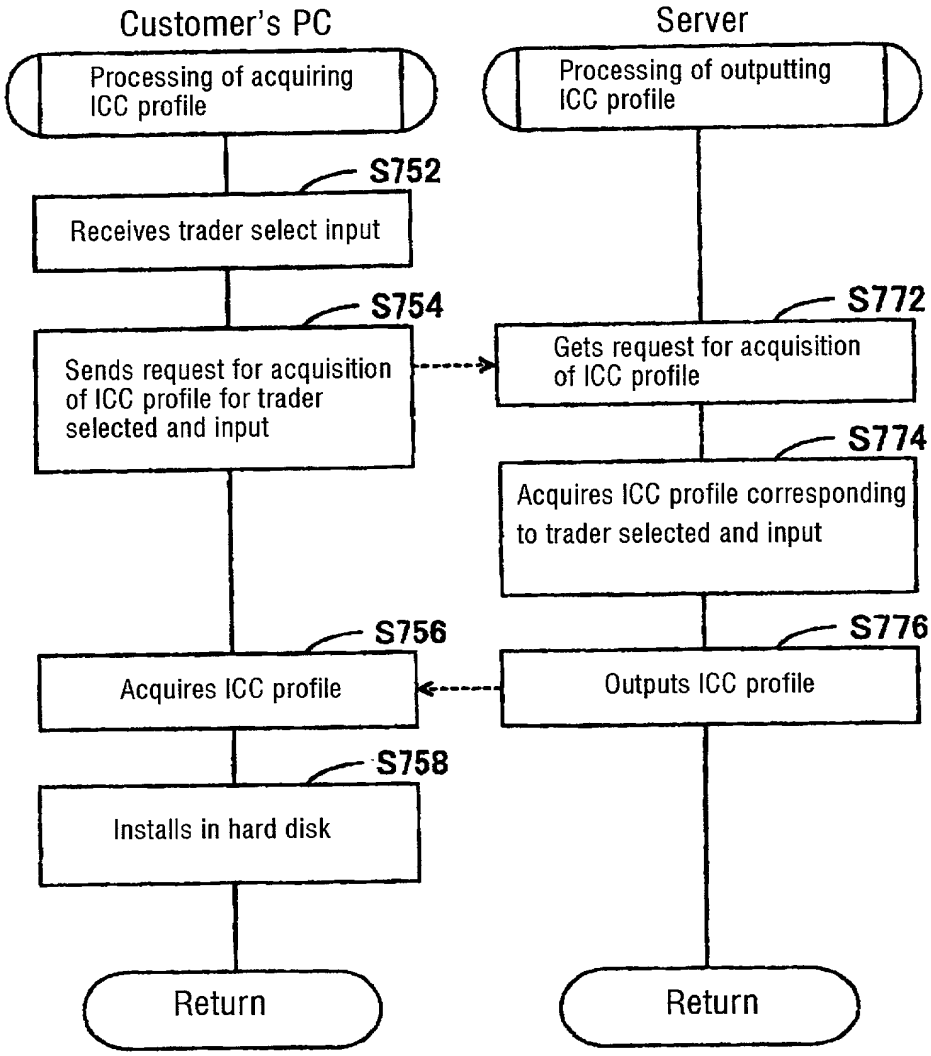
Customer's PC
Server
Processing of acquiring ICC profile
Processing of outputting ICC profile
S752
Receives trader select input
S754
Sends request for acquisition of ICC profile for trader selected and input
S772
Gets request for acquisition of ICC profile
S774
Acquires ICC profile corresponding to trader selected and input
S756
Acquires ICC profile
S776
Outputs ICC profile
S758
Installs in hard disk
Return
Return

FIG. 21

20T90" 0h2580DT

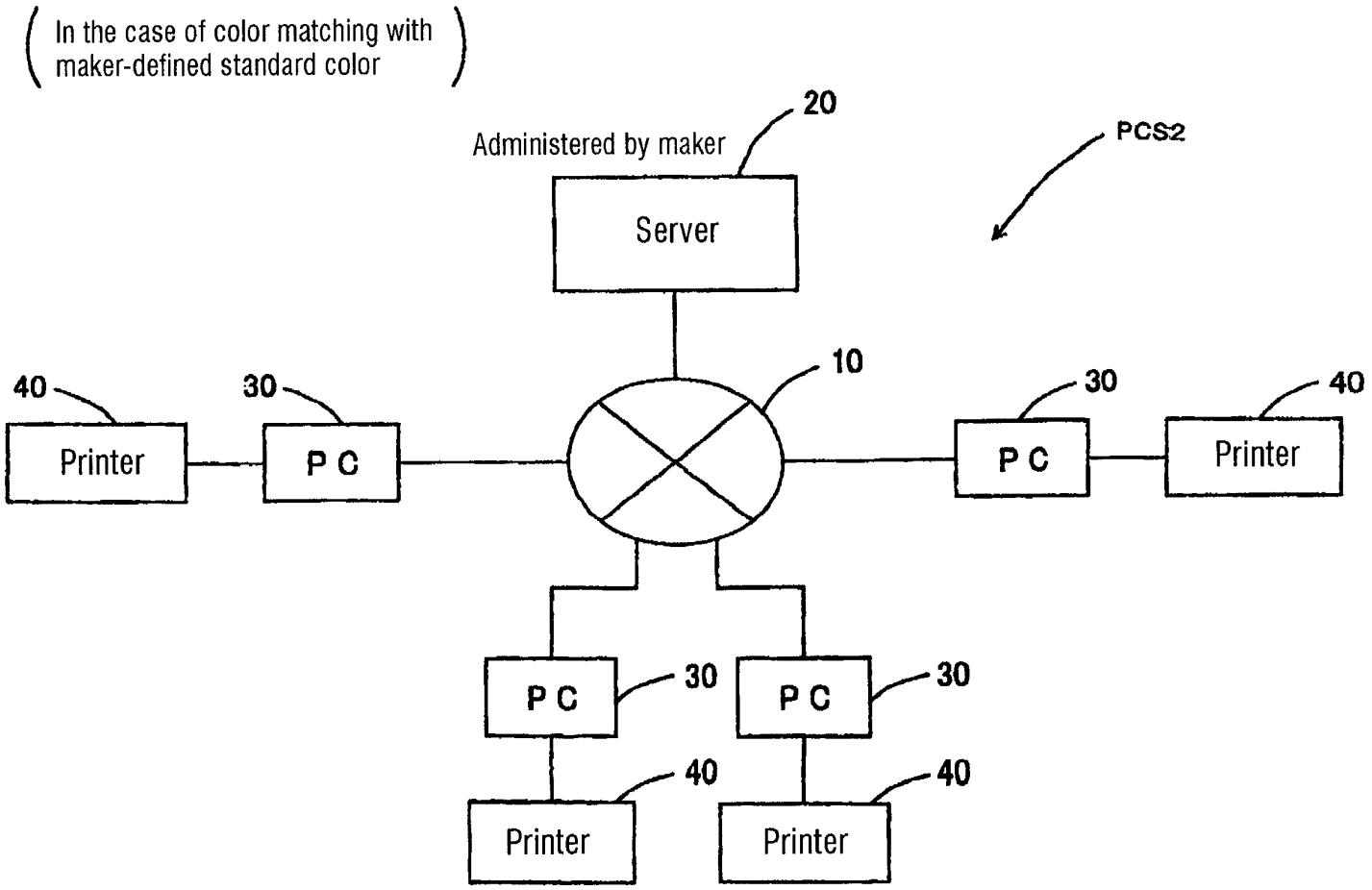

FIG.22

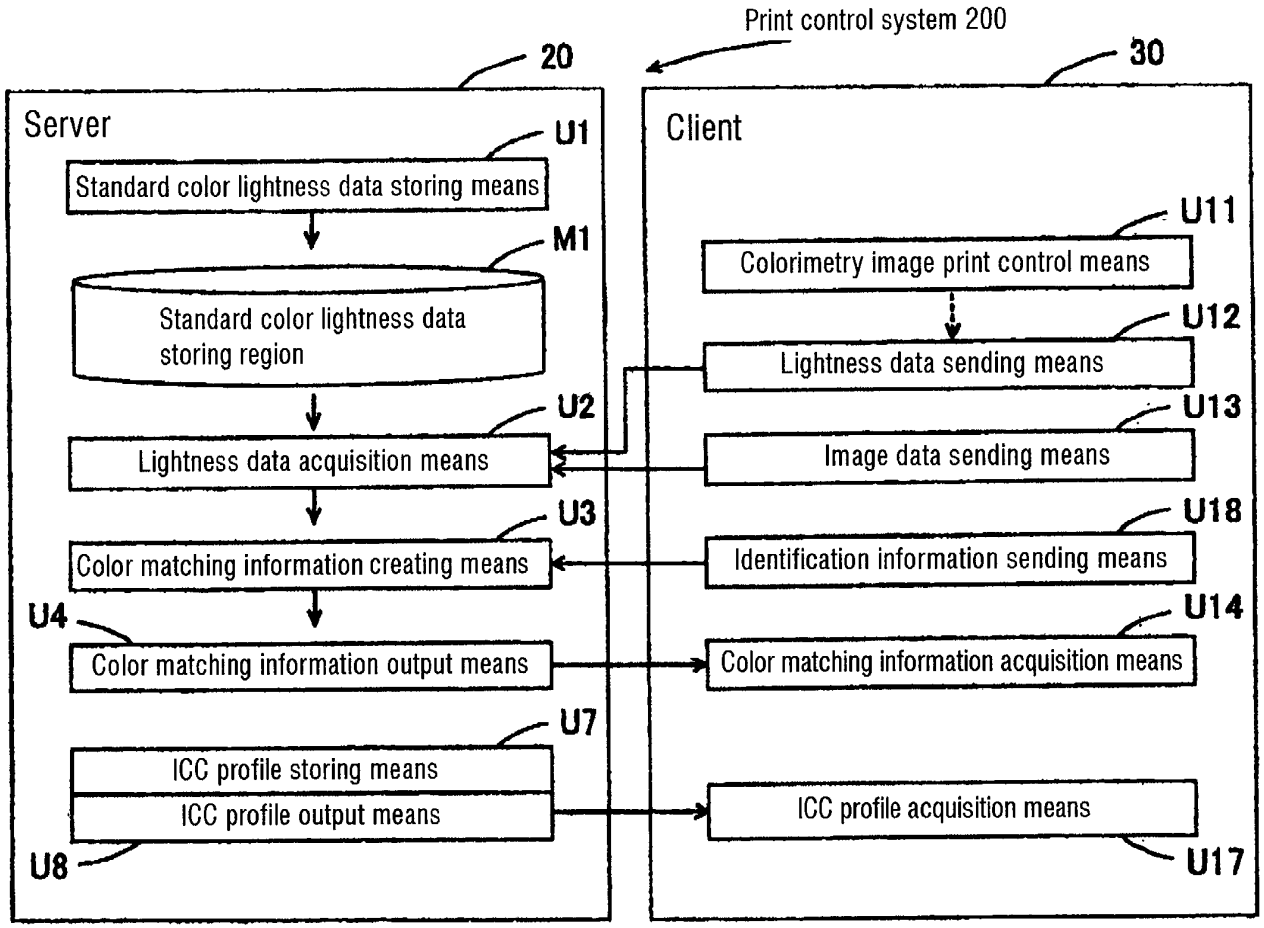
Print control system 200
20
30
Server
U1
Standard color lightness data storing means
M1
Standard color lightness data storing region
U2
Lightness data acquisition means
U3
Color matching information creating means
U4
Color matching information output means
U7
ICC profile storing means
ICC profile output means
U8
Client
U11
Colorimetry image print control means
U12
Lightness data sending means
U13
Image data sending means
U18
Identification information sending means
U14
Color matching information acquisition means
ICC profile acquisition means
U17

FIG.23

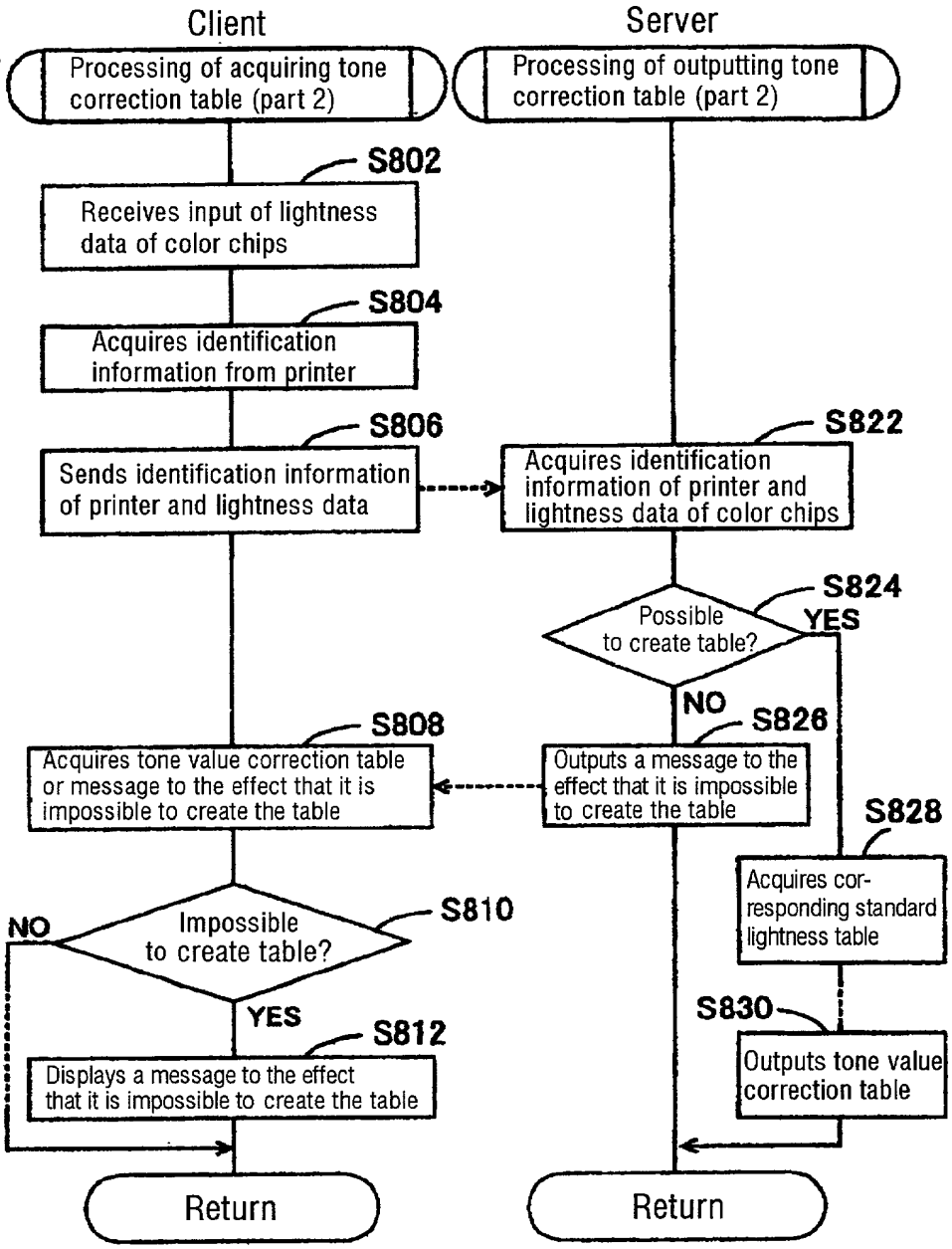
Client
Server
Processing of acquiring tone correction table (part 2)
Processing of outputting tone correction table (part 2)
S802
Receives input of lightness data of color chips
S804
Acquires identification information from printer
S806
Sends identification information of printer and lightness data
S822
Acquires identification information of printer and lightness data of color chips
S824
Possible to create table?
YES
NO
S826
Outputs a message to the effect that it is impossible to create the table
S808
Acquires tone value correction table or message to the effect that it is impossible to create the table
S828
Acquires corresponding standard lightness table
NO
Impossible to create table?
S810
YES
S812
Displays a message to the effect that it is impossible to create the table
S830
Outputs tone value correction table
Return
Return

FIG.24

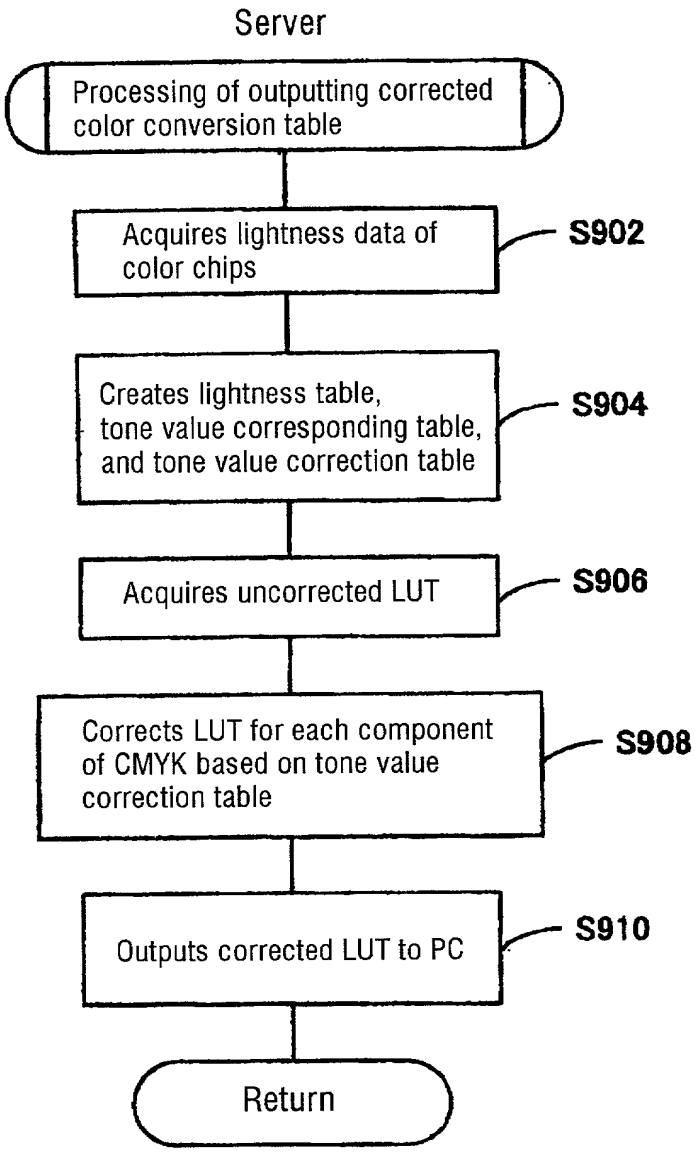
Server
Processing of outputting corrected color conversion table
Acquires lightness data of color chips
S902
Creates lightness table, tone value corresponding table, and tone value correction table
S904
Acquires uncorrected LUT
S906
Corrects LUT for each component of CMYK based on tone value correction table
S908
Outputs corrected LUT to PC
S910
Return

FIG.25

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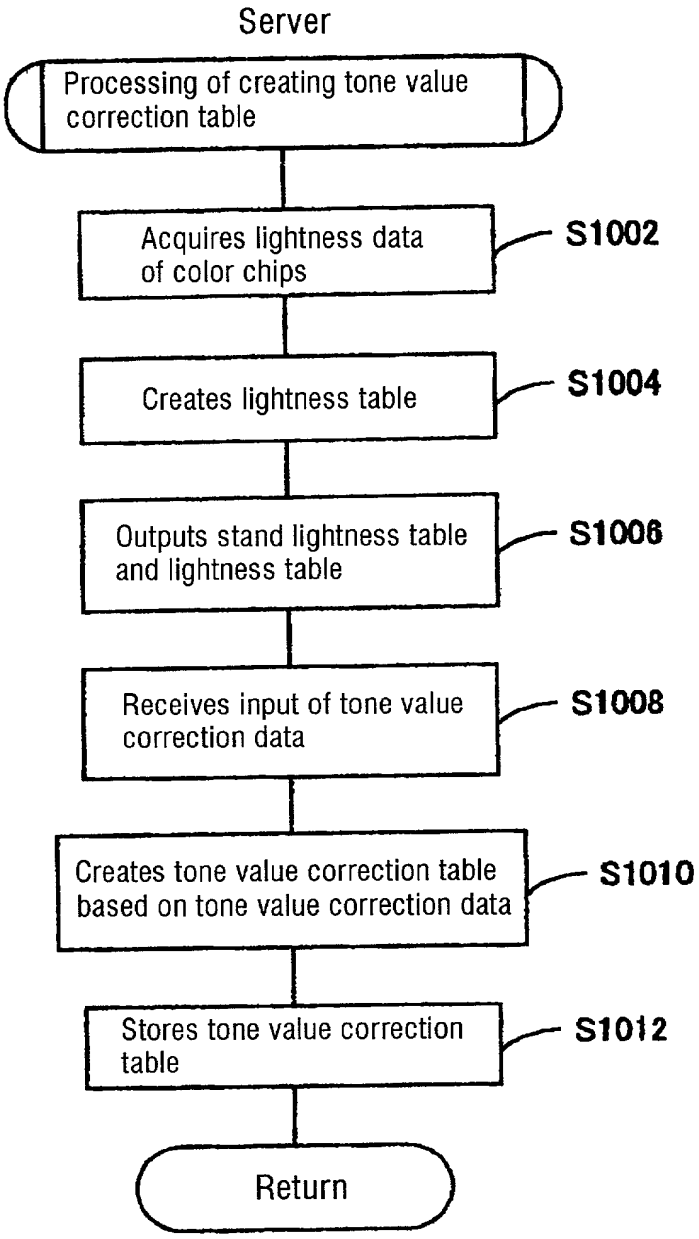

FIG.26

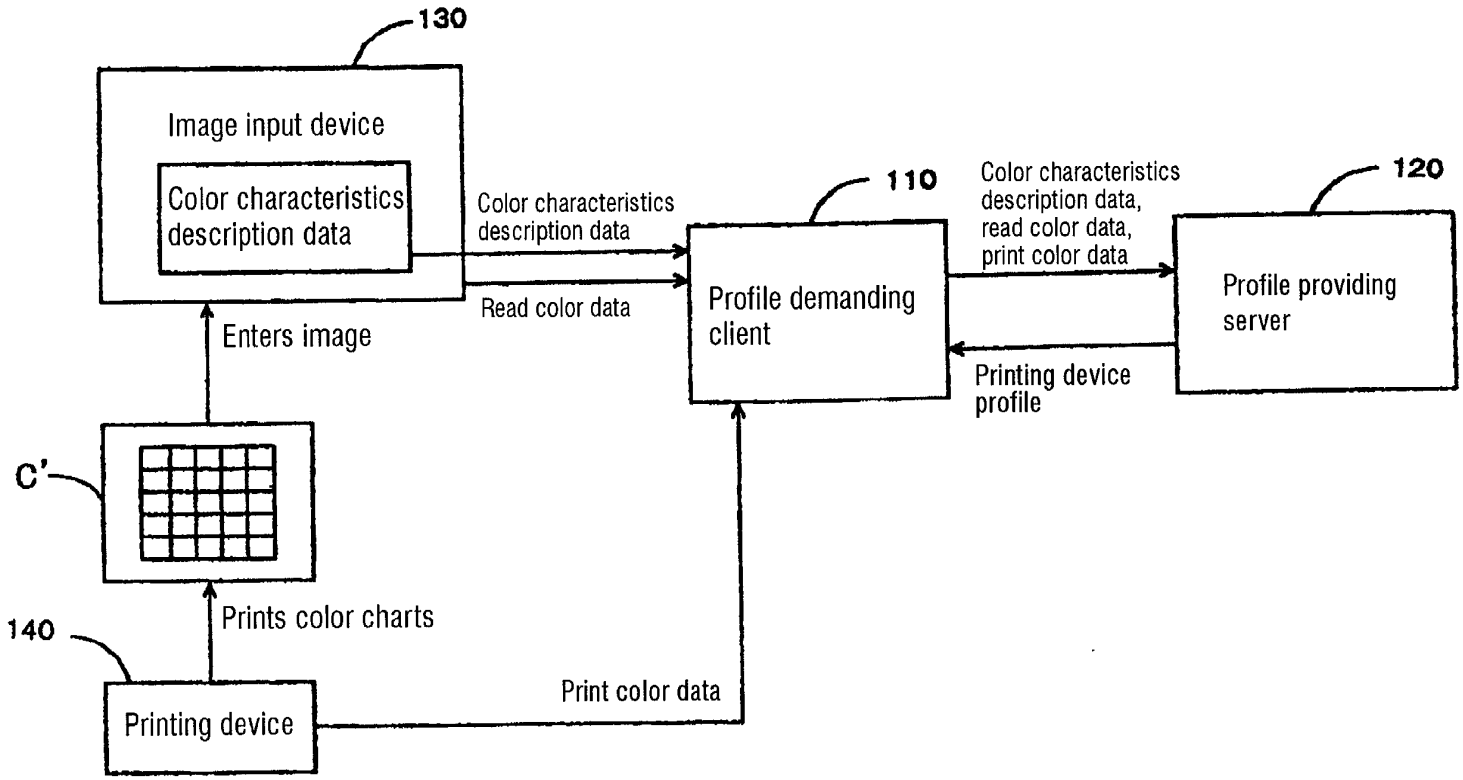
130
Image input device
Color characteristics description data
Color characteristics description data
Read color data
110
Profile demanding client
Color characteristics description data, read color data, print color data
120
Profile providing server
Printing device profile
Enters image
C'
Prints color charts
140
Printing device
Print color data

FIG. 27

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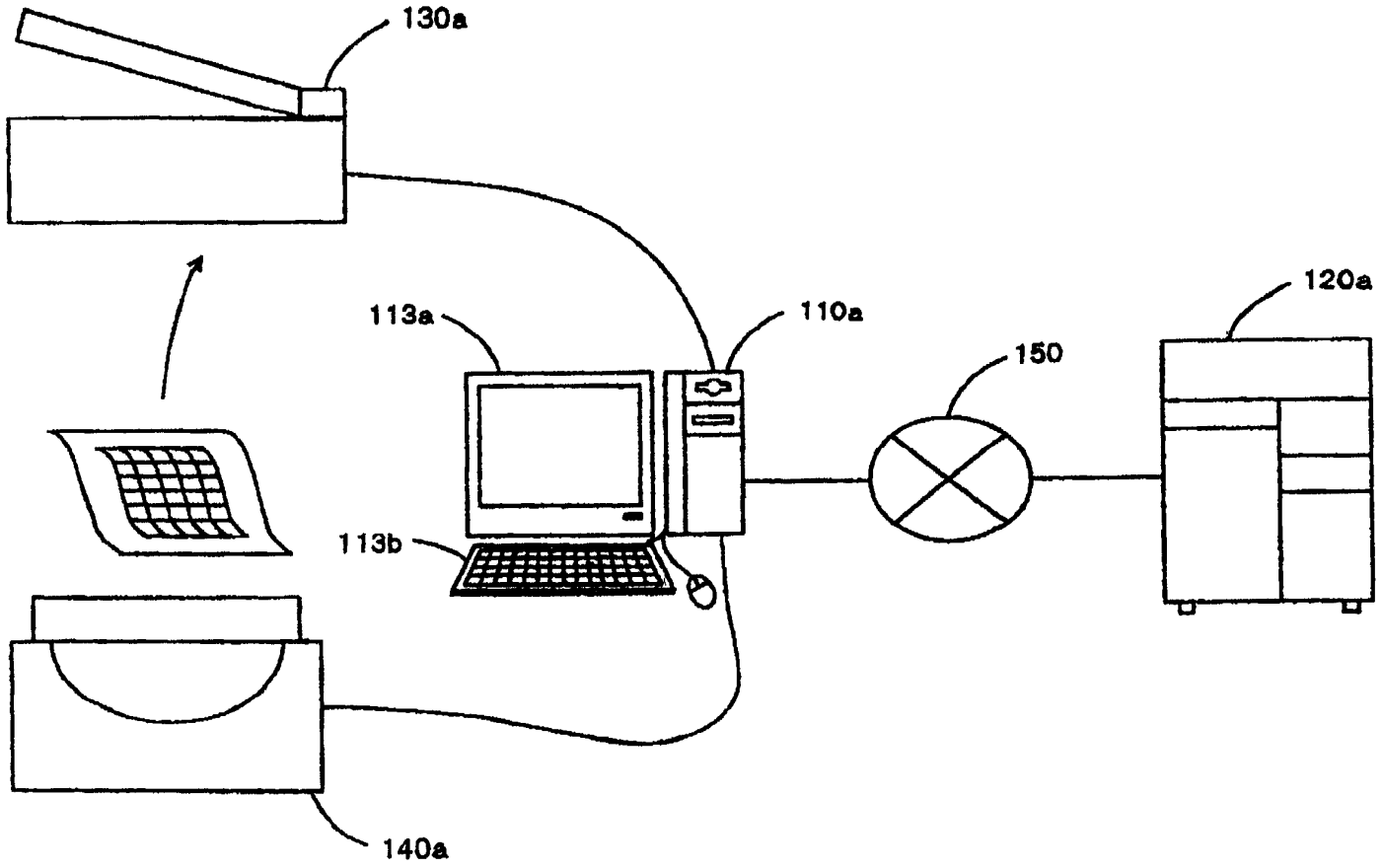


FIG.28

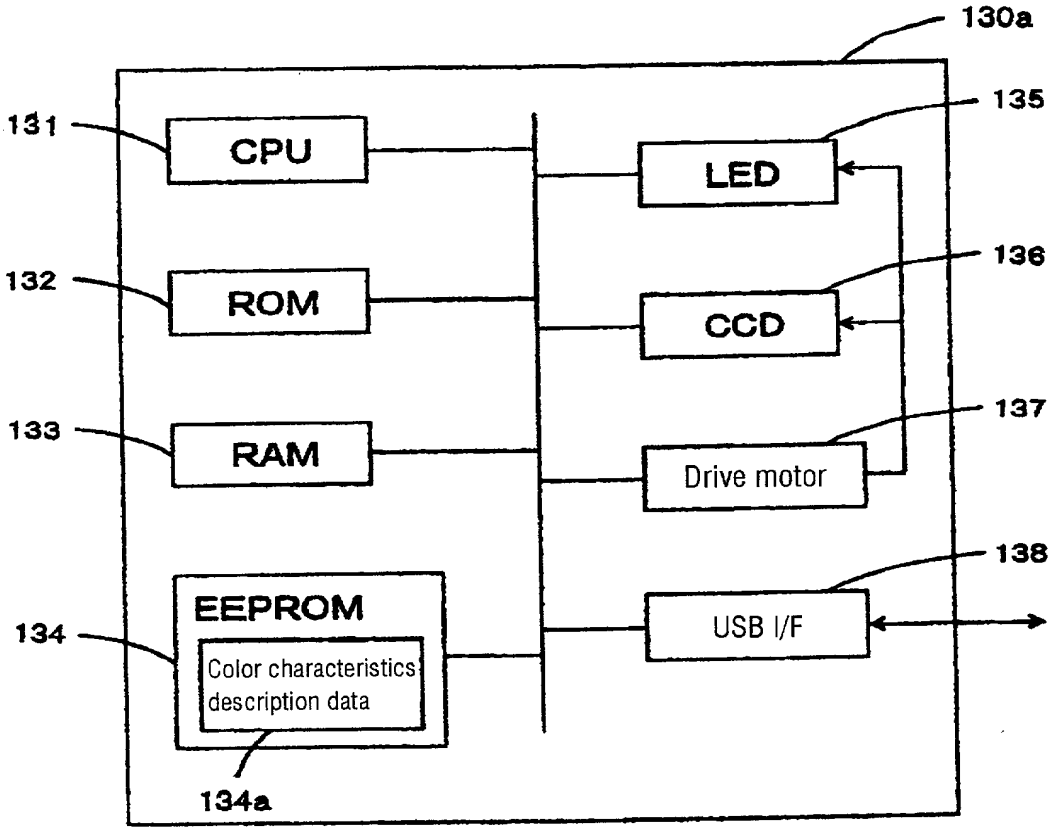

130a
131
CPU
132
ROM
133
RAM
134
EEPROM
Color characteristics description data
134a
135
LED
136
CCD
137
Drive motor
138
USB I/F

FIG.29

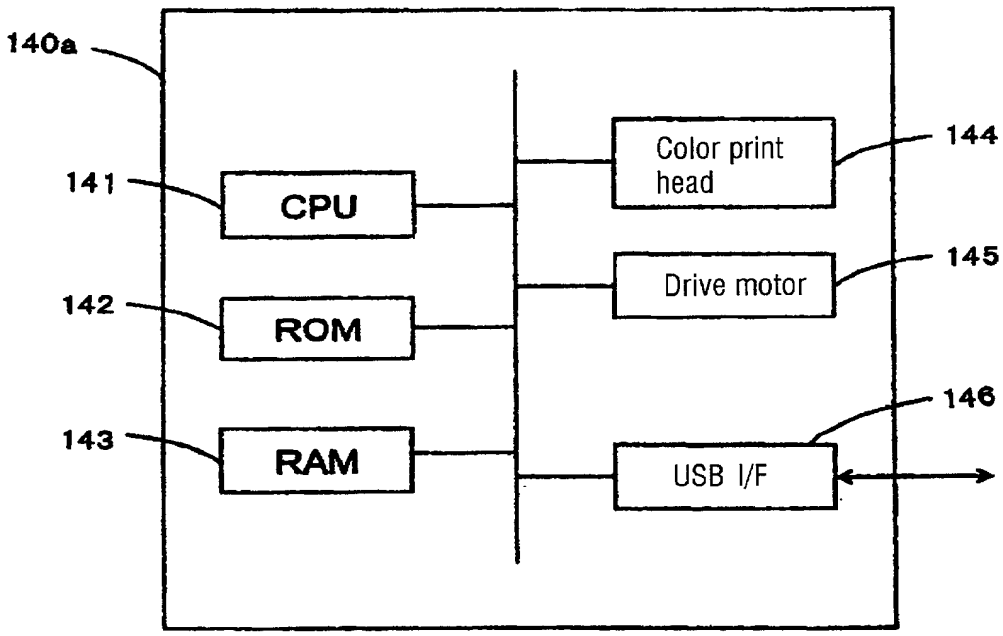

140a
141
CPU
142
ROM
143
RAM
Color print head
144
Drive motor
145
146
USB I/F

FIG.30

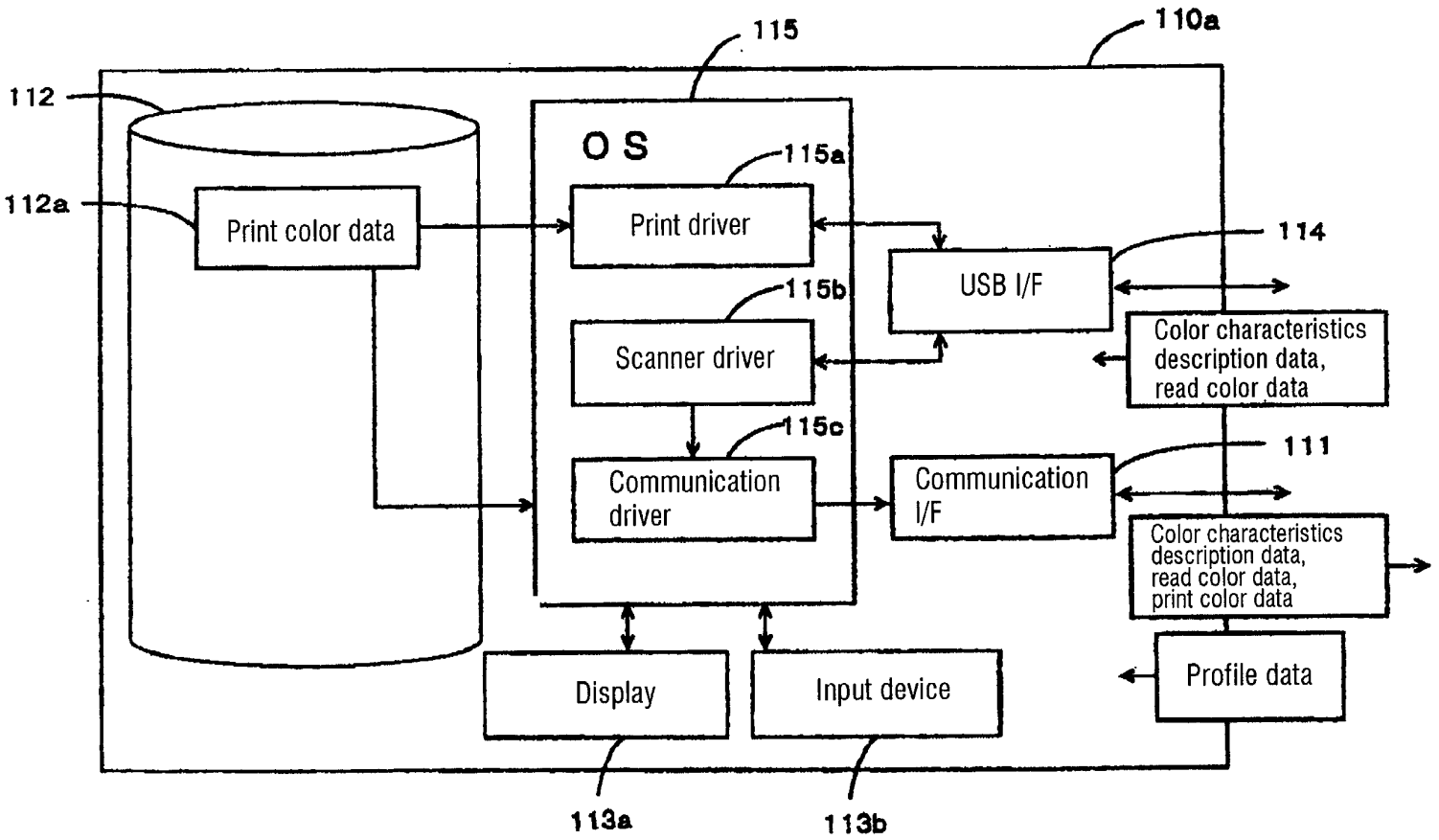

115
110a
112
OS
115a
112a
Print color data
Print driver
114
USB I/F
115b
Scanner driver
Color characteristics description data, read color data
115c
111
Communication driver
Communication I/F
Color characteristics description data, read color data, print color data
Profile data
Display
Input device
113a
113b

FIG.31

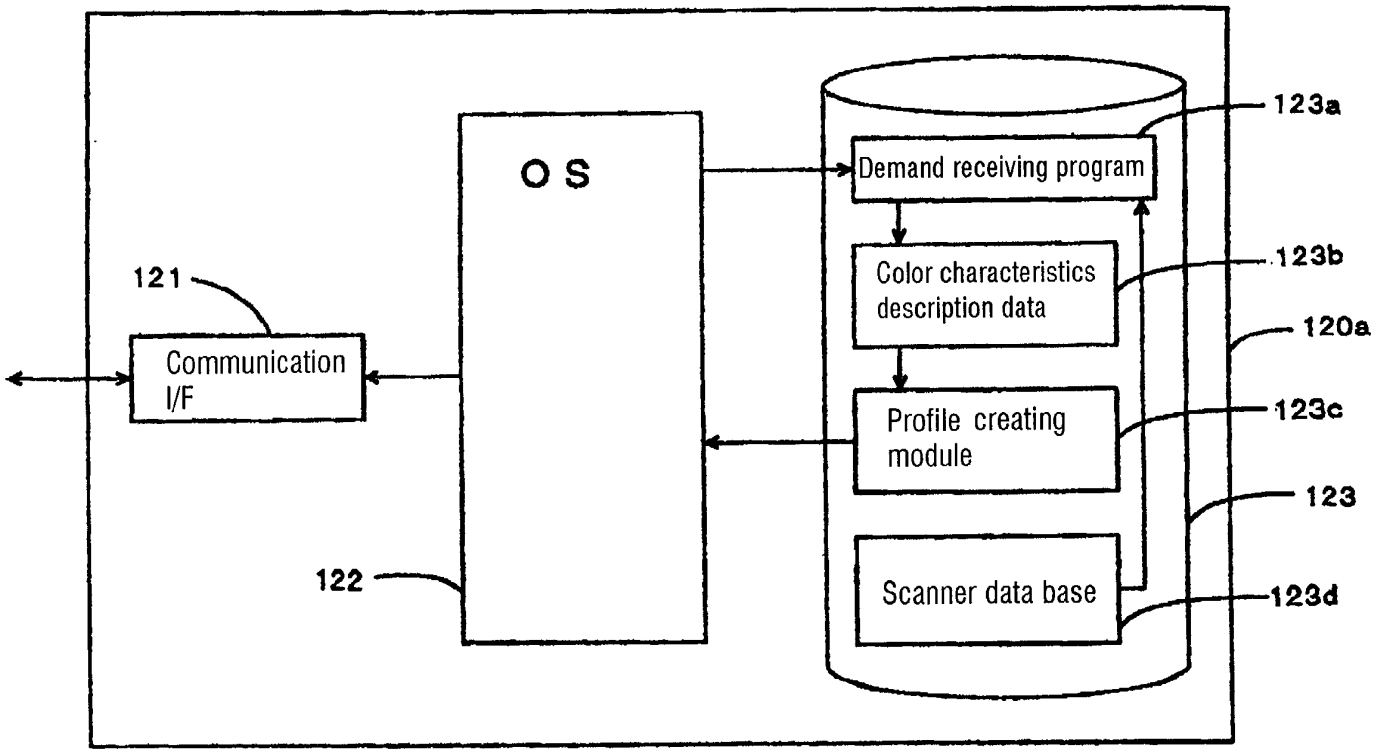

OS
Demand receiving program
Color characteristics description data
Profile creating module
Scanner data base
Communication I/F
121
122
123a
123b
120a
123c
123
123d

FIG.32

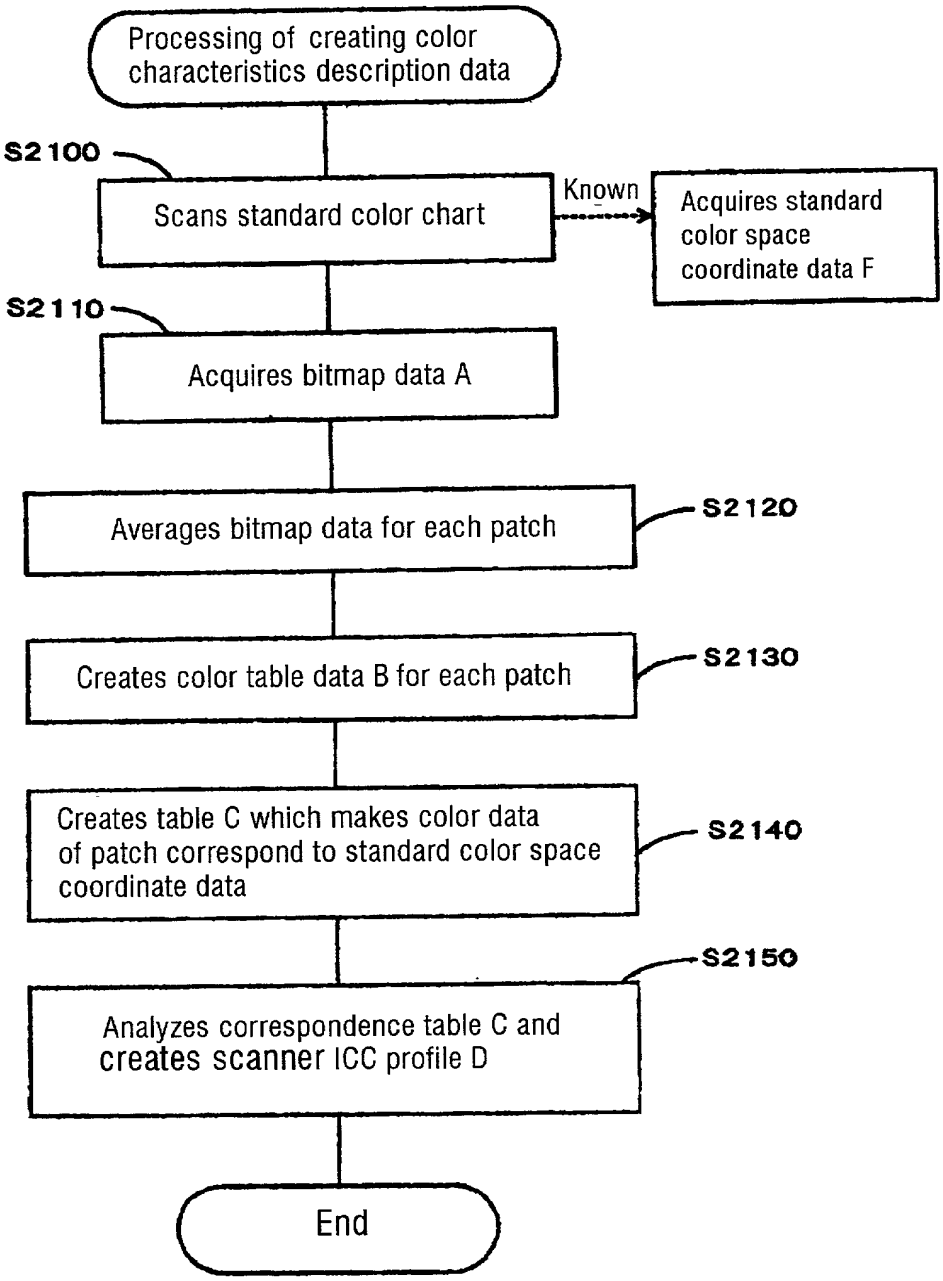

Processing of creating color characteristics description data
S2100
Scans standard color chart
Known
Acquires standard color space coordinate data F
S2110
Acquires bitmap data A
Averages bitmap data for each patch
S2120
Creates color table data B for each patch
S2130
Creates table C which makes color data of patch correspond to standard color space coordinate data
S2140
S2150
Analyzes correspondence table C and creates scanner ICC profile D
End

FIG.33

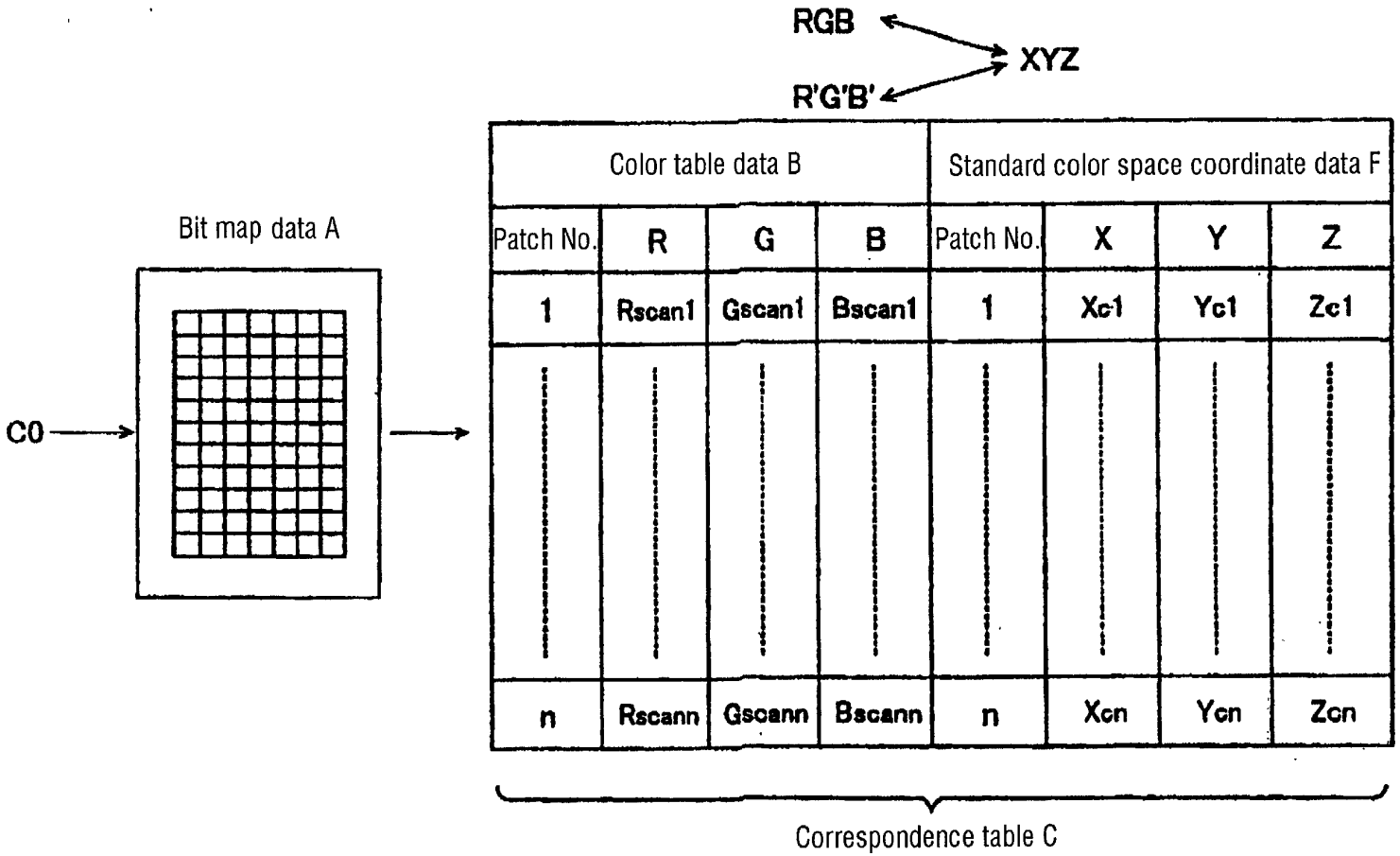
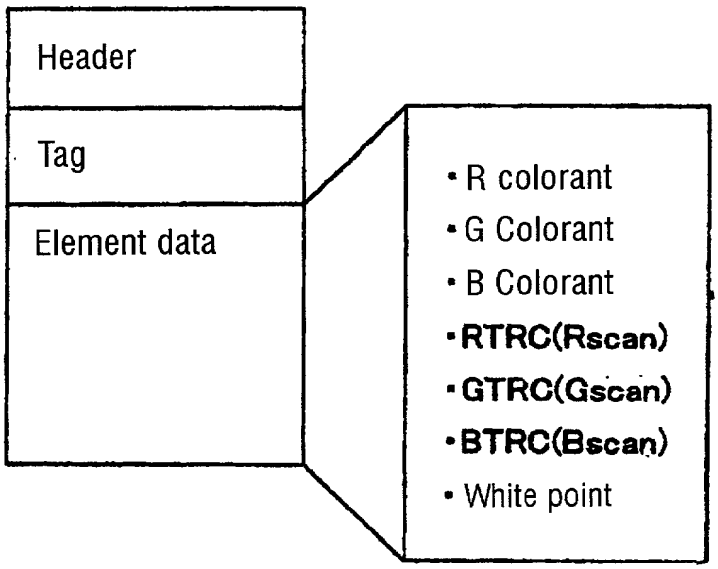

RGB
XYZ
R'G'B'
Bit map data A
C0
Color table data B
Standard color space coordinate data F
Patch No.
R
G
B
Patch No.
X
Y
Z
1
Rscan1
Gscan1
Bscan1
1
Xc1
Yc1
Zc1
n
Rscann
Gscann
Bscann
n
Xcn
Ycn
Zcn
Correspondence table C

FIG.34

Scanner ICC profile D



$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix} = \begin{pmatrix} \text{Colorant} \\ \text{matrix} \end{pmatrix} \begin{pmatrix} \text{RTRC(Rscan)} \\ \text{GTRC(Gscan)} \\ \text{BTRC(Bscan)} \end{pmatrix}$$

FIG.35

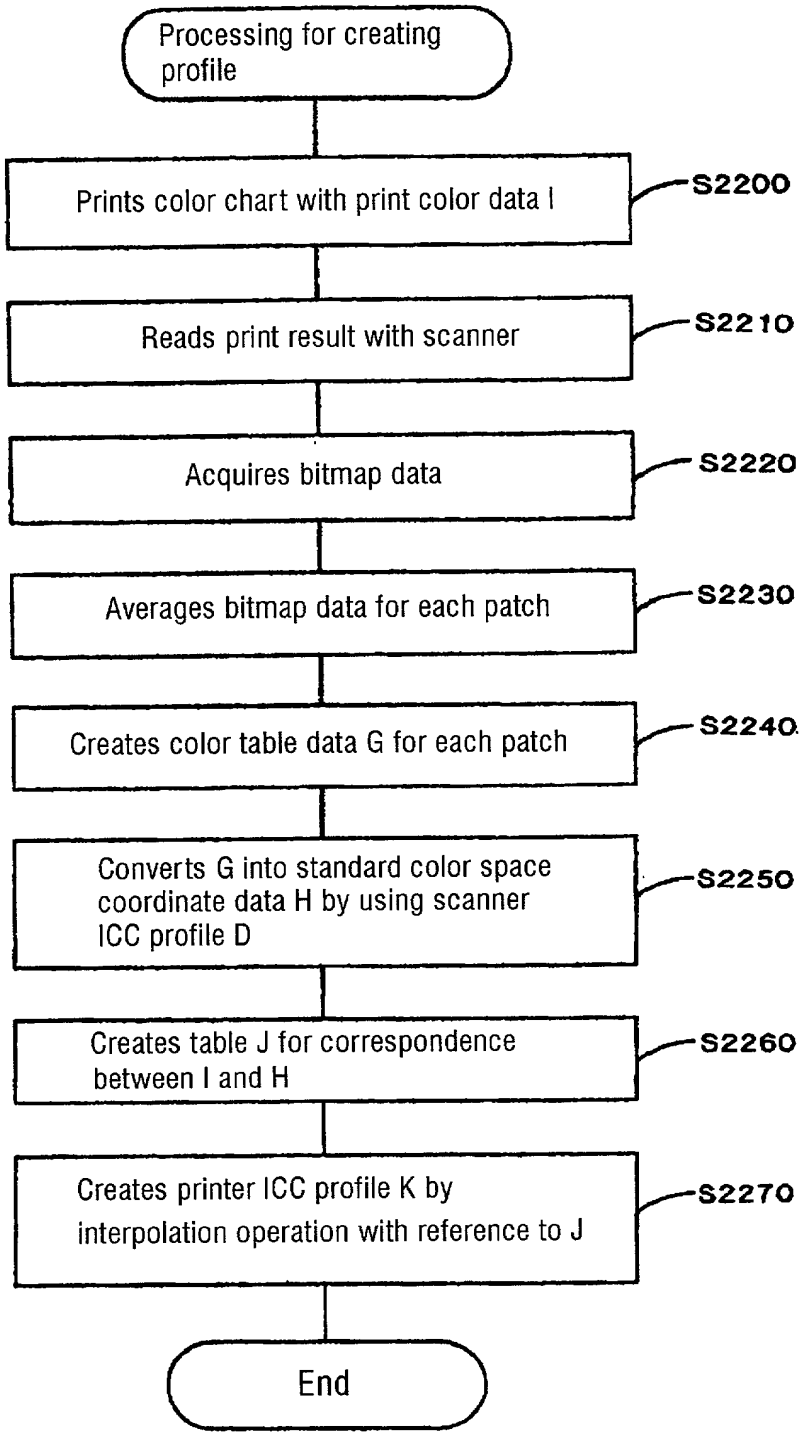
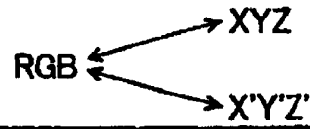

Processing for creating profile
Prints color chart with print color data I
S2200
Reads print result with scanner
S2210
Acquires bitmap data
S2220
Averages bitmap data for each patch
S2230
Creates color table data G for each patch
S2240
Converts G into standard color space coordinate data H by using scanner ICC profile D
S2250
Creates table J for correspondence between I and H
S2260
Creates printer ICC profile K by interpolation operation with reference to J
S2270
End

FIG.36

20/T90" 0h2580OT



Color table data G				Print data I				Standard color space coordinate data H			
Patch No.	R	G	B	Patch No.	R	G	B	Patch No.	X	Y	Z
1	Rprint1	Gprint1	Bprint1	1	Ront1	Gont1	Bont1	1	Xprint1	Yprint1	Zprint1
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
n	Rprintn	Gprintn	Bprintn	n	Rontn	Gontn	Bontn	n	Xprintn	Yprintn	Zprintn

Correspondence table J

FIG.37

Printer ICC profile K

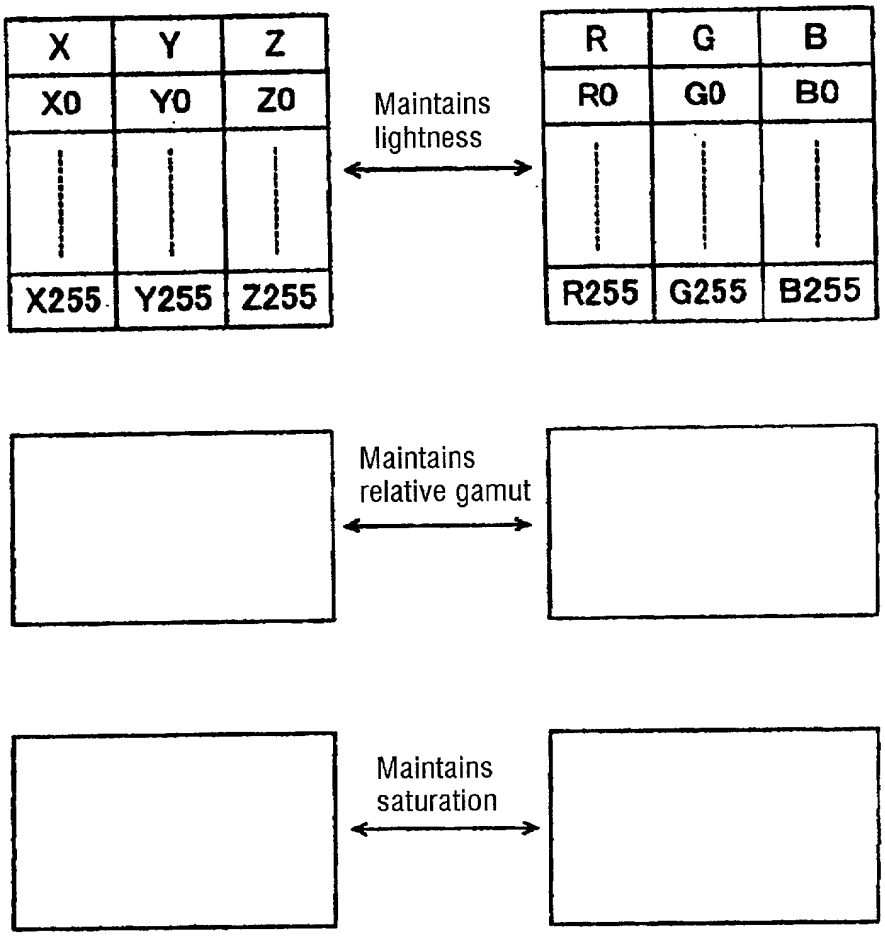


FIG.38

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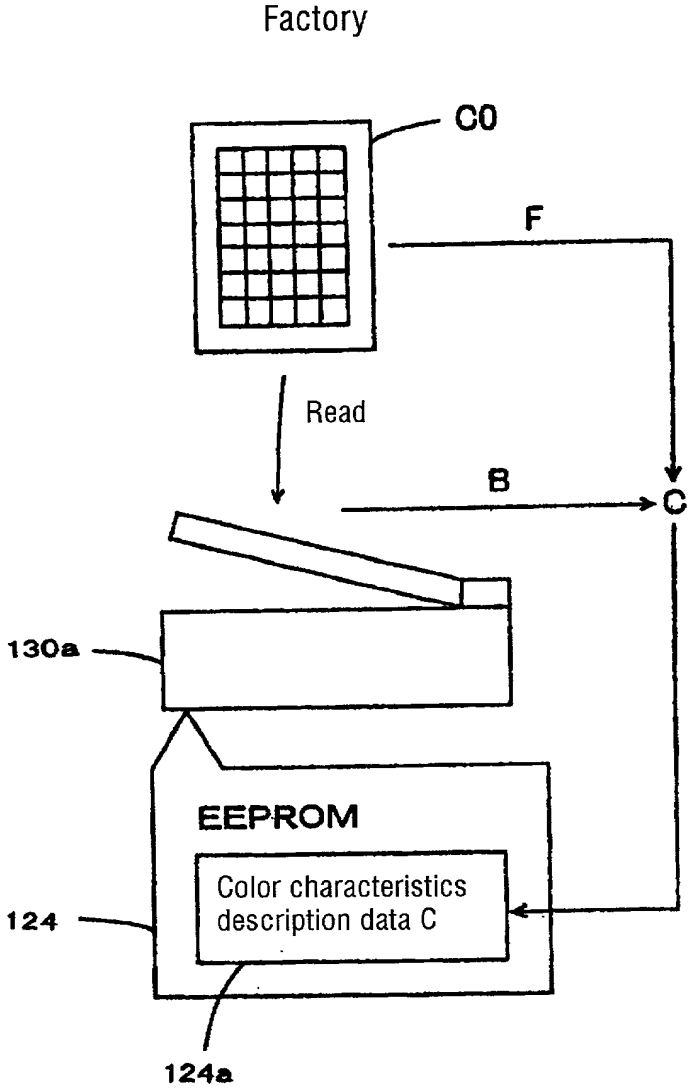

FIG.39

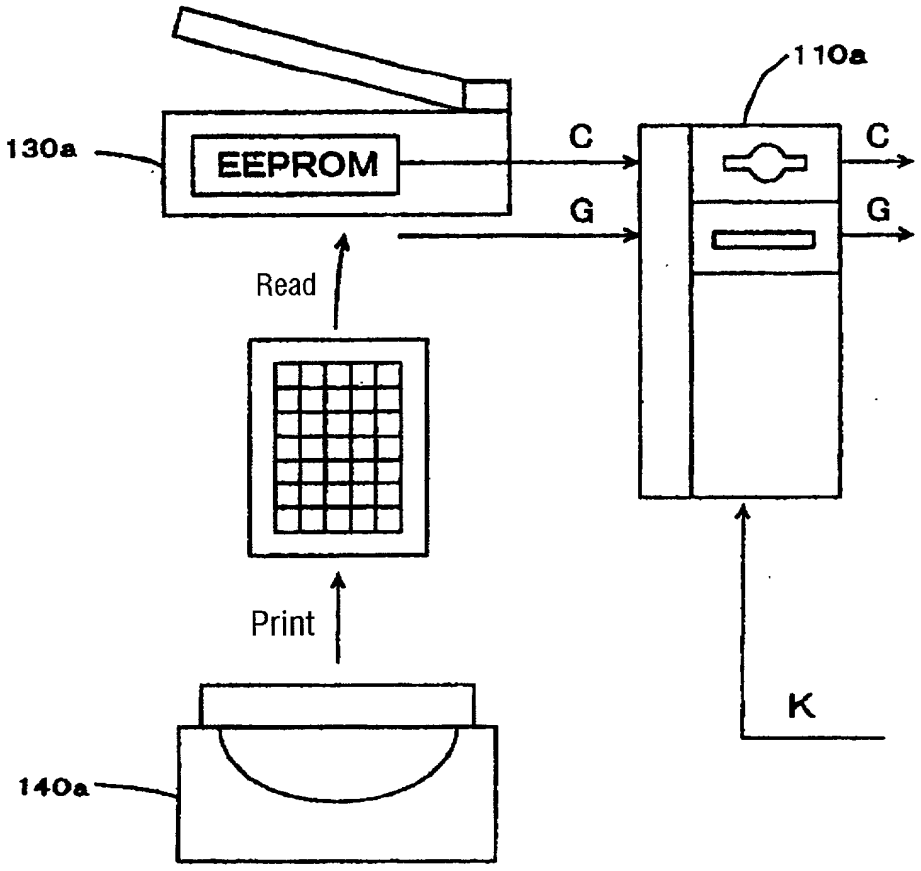

FIG.40

Server

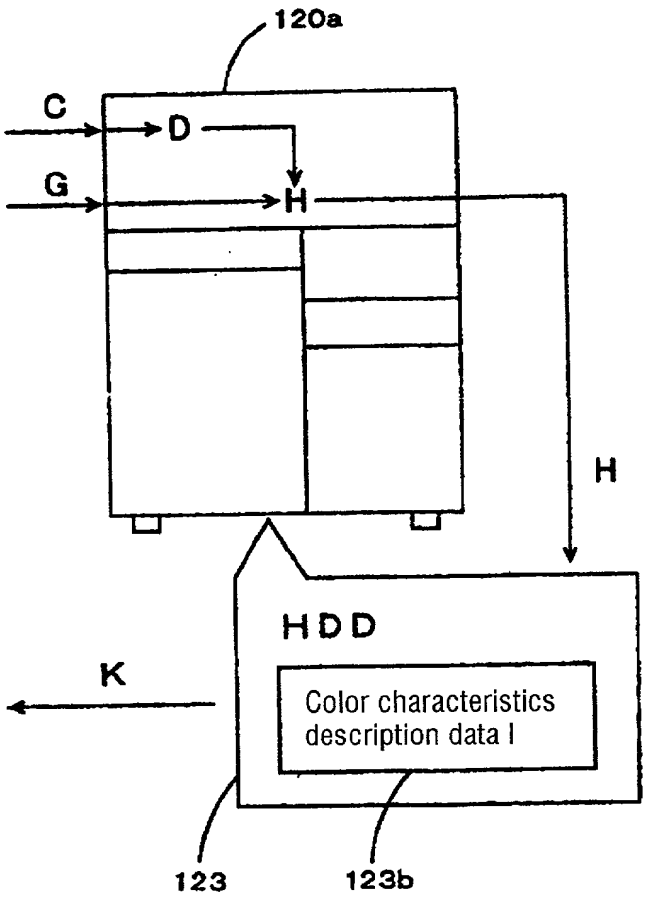

FIG.41

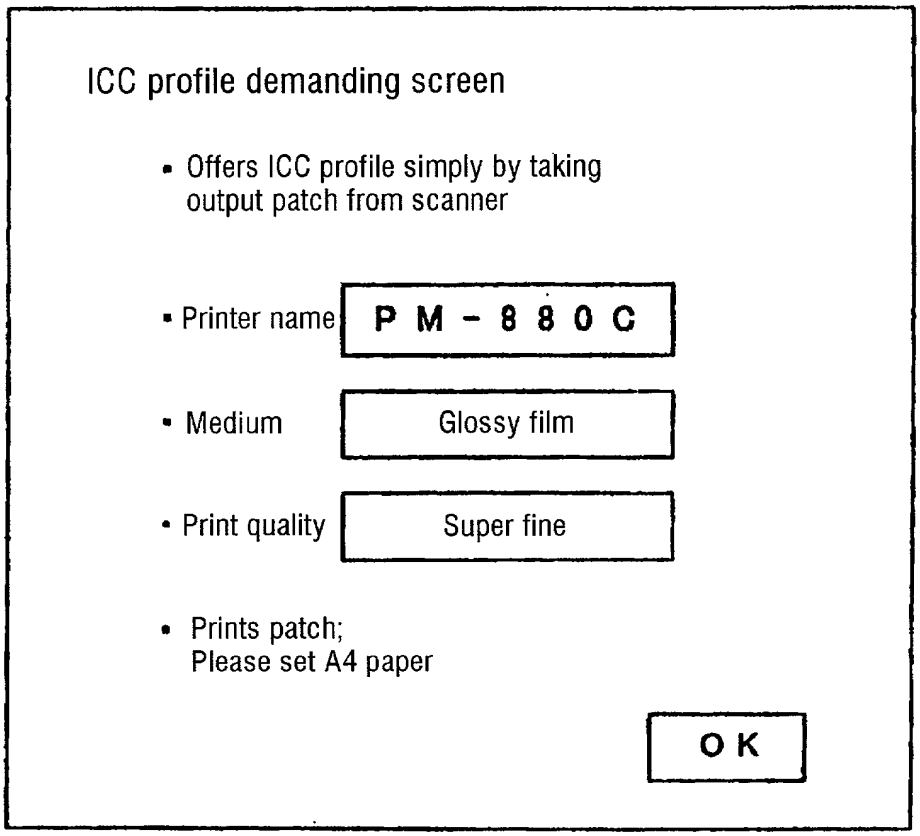
ICC profile demanding screen
• Offers ICC profile simply by taking output patch from scanner
• Printer name
PM-880C
• Medium
Glossy film
• Print quality
Super fine
• Prints patch; Please set A4 paper
OK

FIG.42

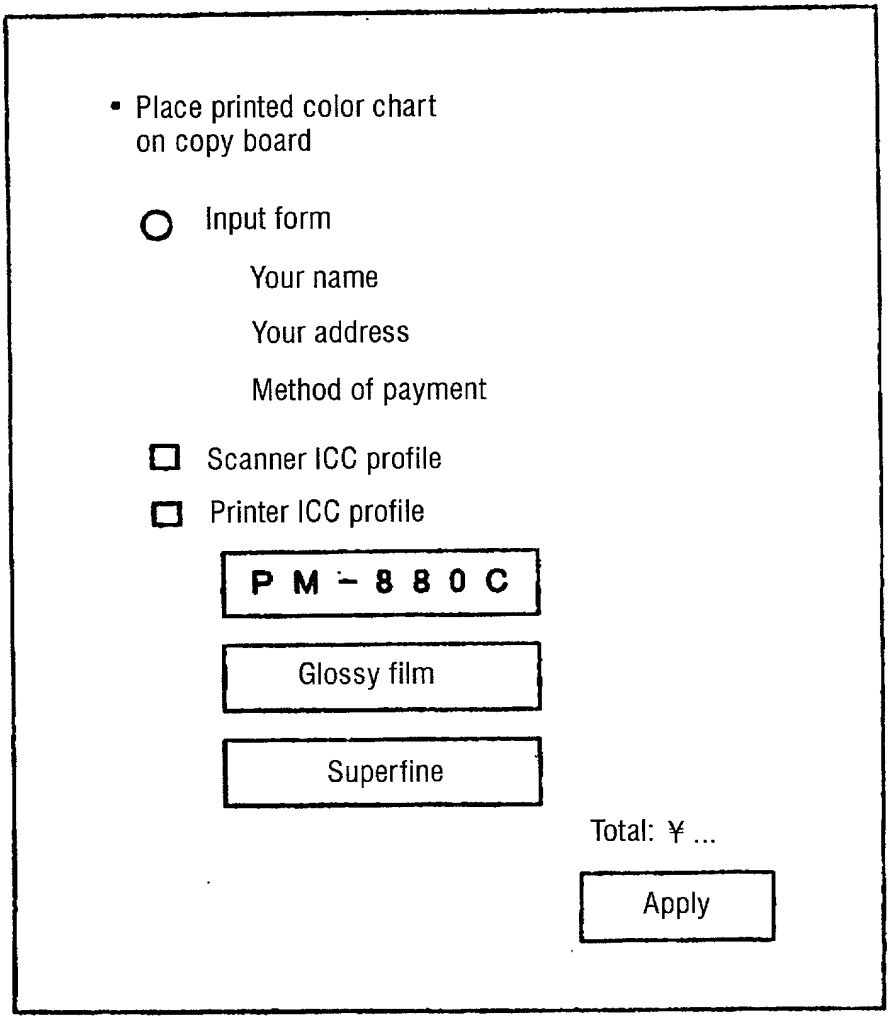
• Place printed color chart on copy board
Input form
Your name
Your address
Method of payment
Scanner ICC profile
Printer ICC profile
PM-880C
Glossy film
Superfine
Total: ¥ ...
Apply

FIG.43

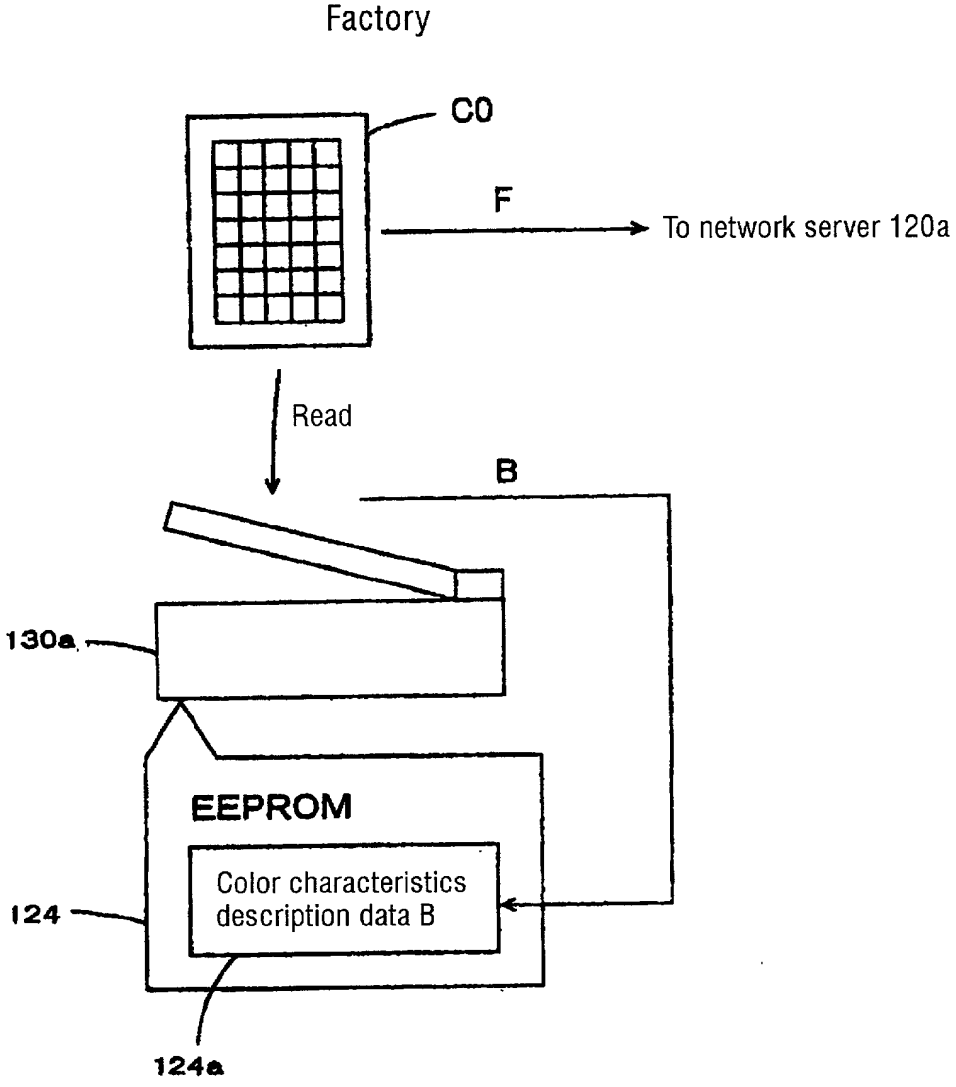
Factory
C0
F
To network server 120a
Read
B
130a
EEPROM
Color characteristics description data B
124
124a

FIG.44

User

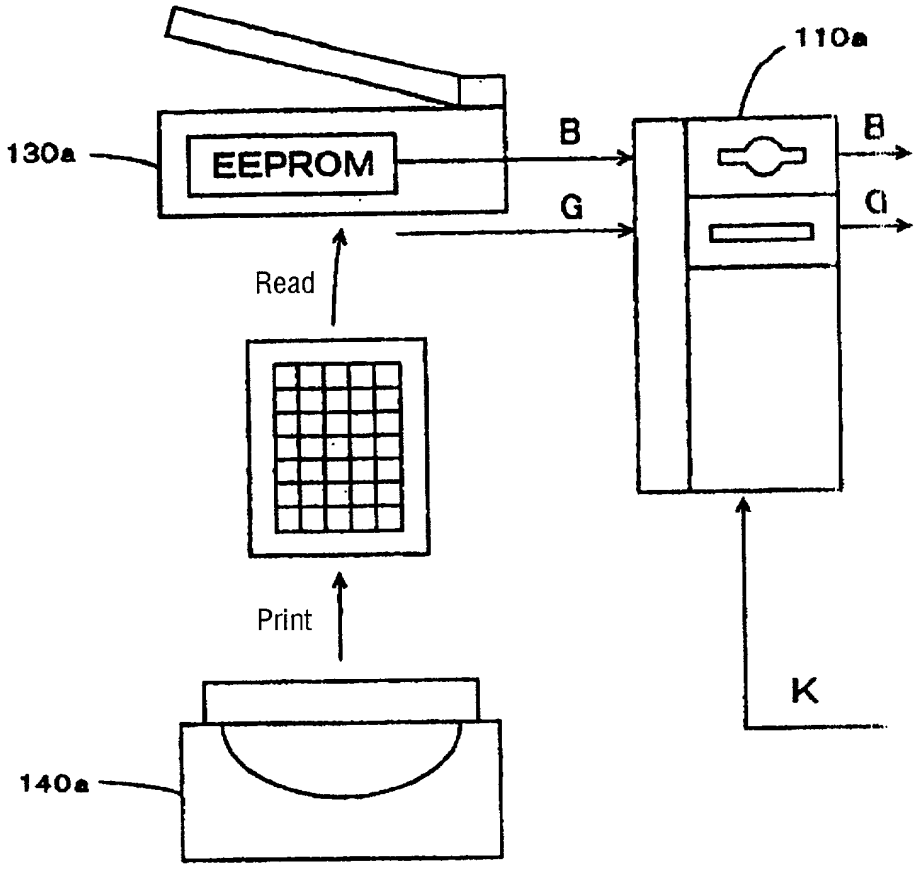

FIG.45

Server

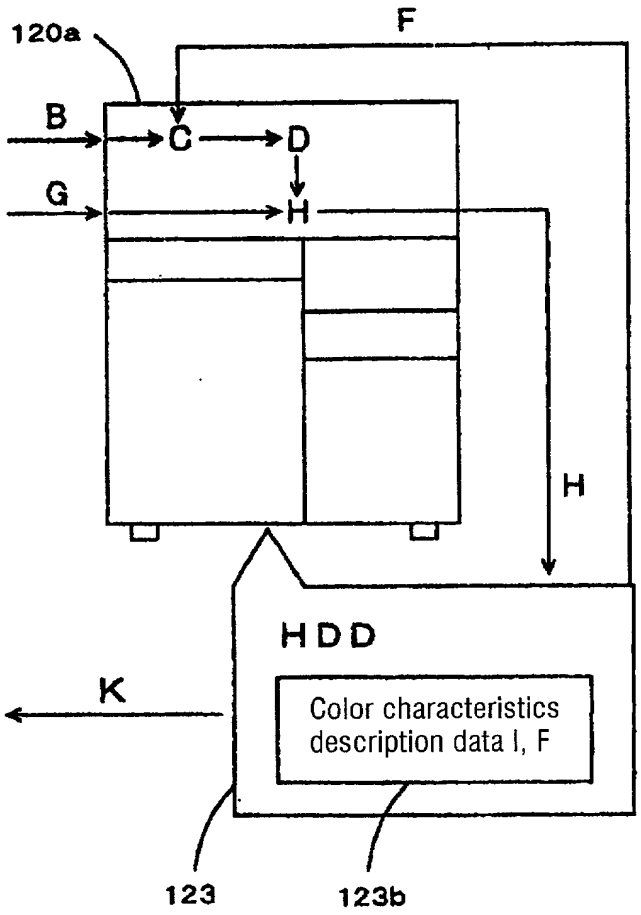

FIG.46

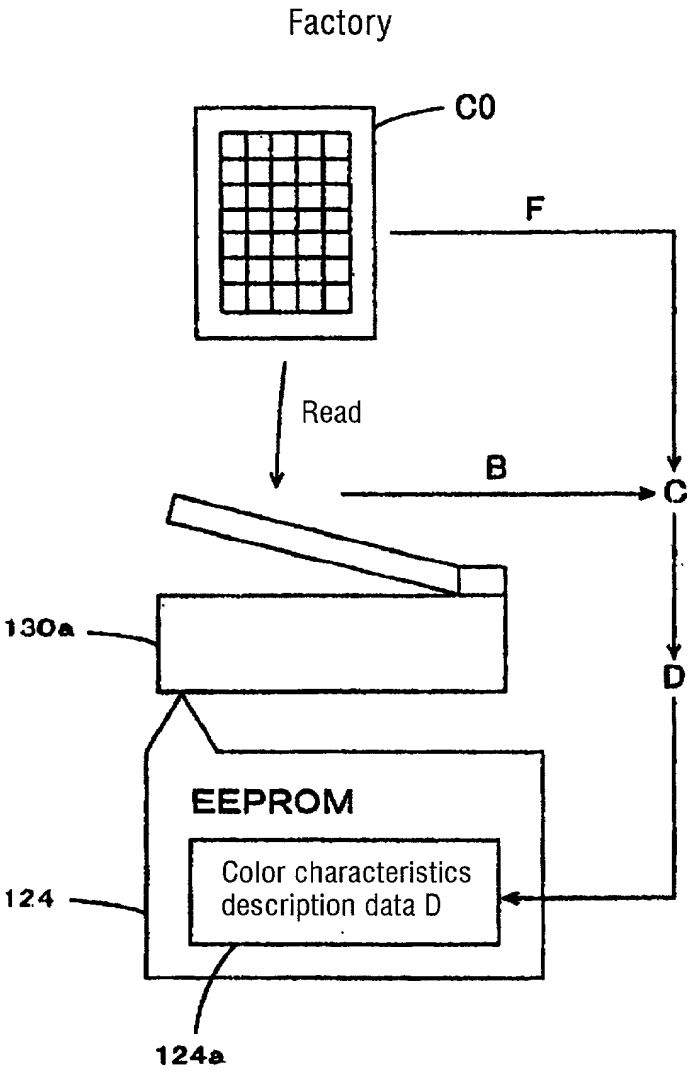
Factory
C0
F
Read
B
C
130a
D
EEPROM
Color characteristics description data D
124
124a

FIG.47

EP 0 745 955 A2

User

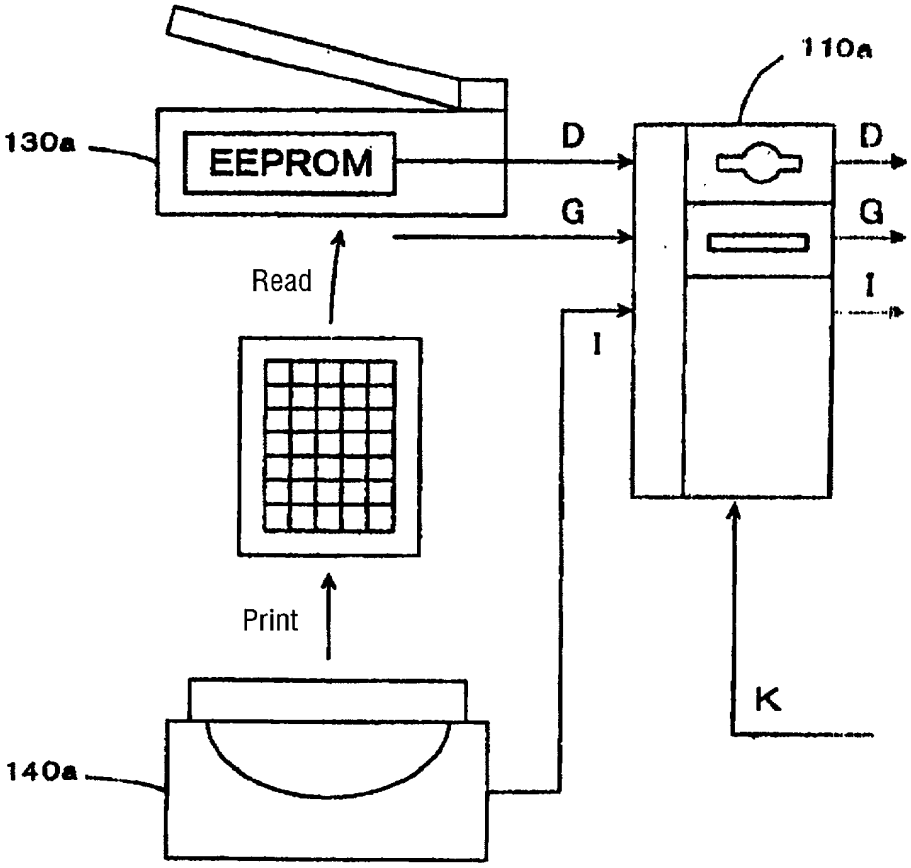

FIG.48

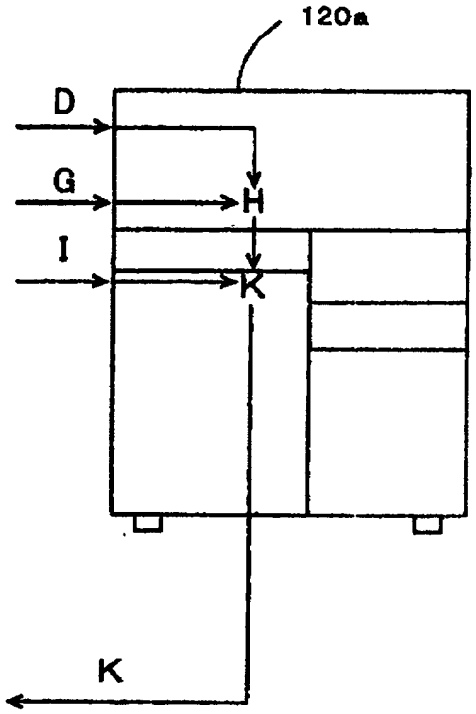

FIG.49

20/T90" Dh258007

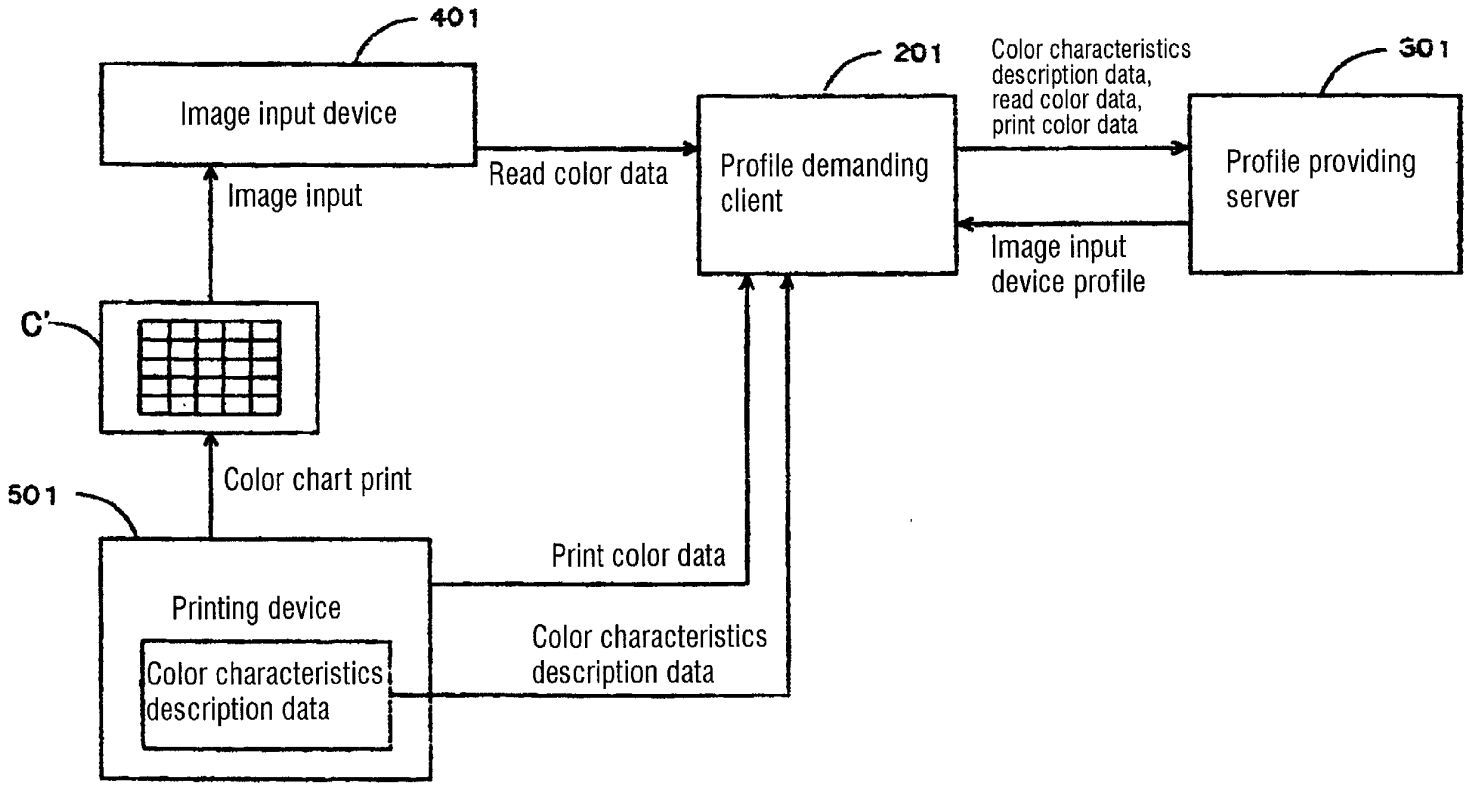

FIG.50